the PLANNING FOR MAJOR UNIT TURNAROUNDS

OIL AND GAS JOURNAL

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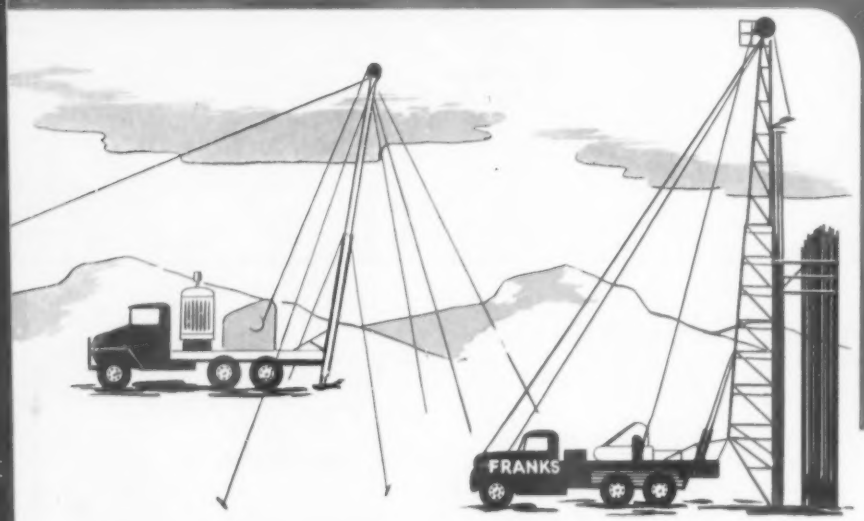

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By asking your well servicing contractor to use FRANKS DERRICK TYPE SERVICING UNITS, you will get **faster rig-up and down** (no guying to ground); **faster moving** (lines remain strung and derrick folds over truck for roading); **faster and safer operation** (since derrick permits use of an air rod lift transfer and has provisions for the quicker method of stacking rods and tubing).

This means you will have your job done in up to one-half the regular overall time.

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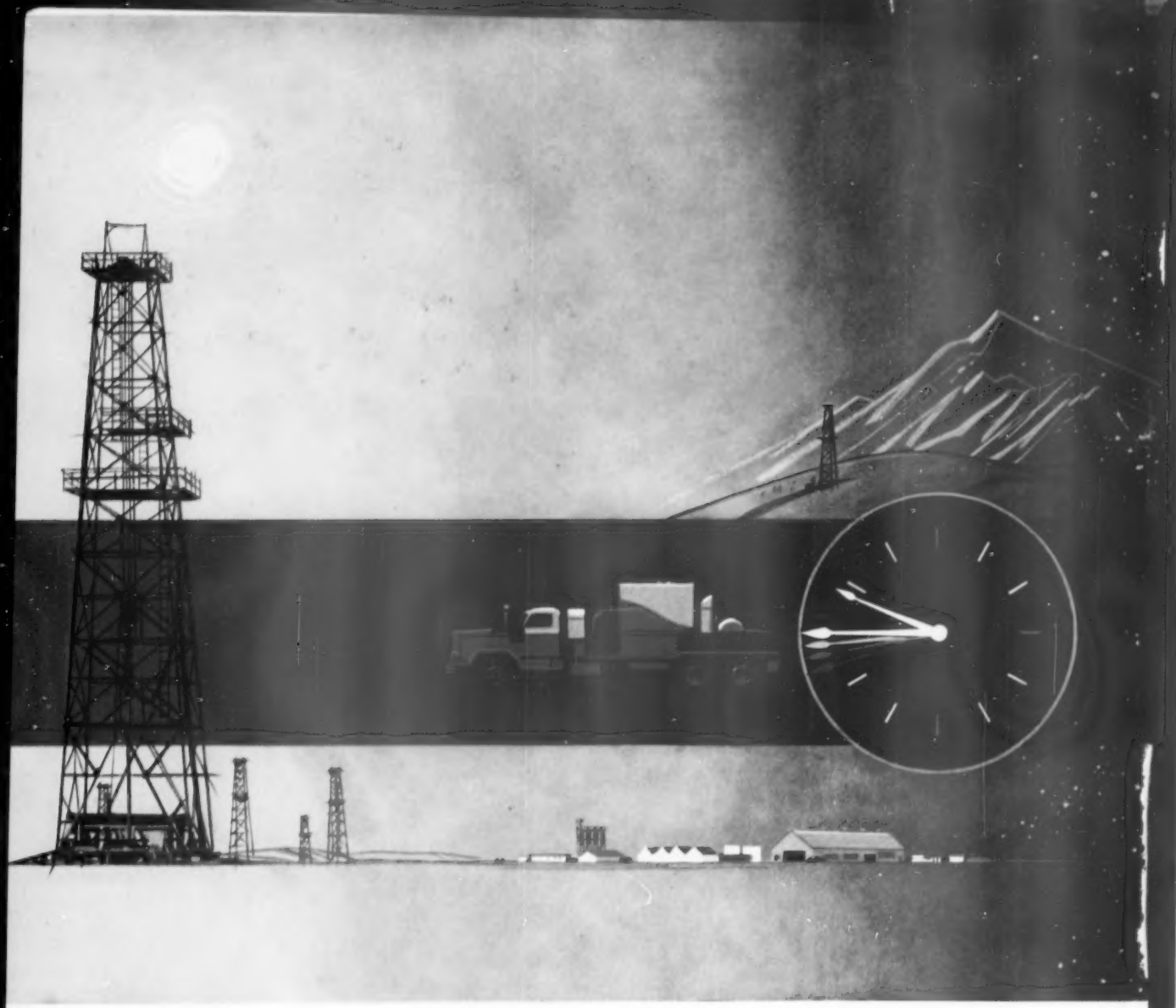
Only Franks offers "on the spot" field service, with stock of parts and factory trained personnel available at: Alice, Compton, Casper, Farmington, Great Bend, Houston, Kilgore, Odessa, Seminole, Edmonton, and Tulsa.



JUST MINUTES AWAY *from any rig*

The derrickman on his monkey board could point out Halliburton's camp in almost every oil patch. 211 of these service centers in this country alone puts one of them just minutes away wherever you are. And being handiest is but half of it . . . Halliburton's camps are fully equipped with the most advanced tools and technology and manned by reliable personnel with the know-how of experience on more than two million jobs. Minutes after you hang up the phone, your Halliburton representative is there at the rig ready to provide the uniform high quality service that has made Halliburton most popular with most operators. It's a good habit to get Halliburton . . . when you want reliable, minutes-away service in Drill Stem Testing, Electrical Well Logging, Formation Fracturing, Cementing, and other production improvement services. Take advantage of this time saving convenience. Phone Halliburton first.

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SEPTEMBER 13, 1954 VOL. 53 NO. 19

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In Brief . . .

1. NEW LOGGING METHOD . . . Recent work on interpretations of electric logs in shaly sands has produced the basic knowledge needed for quantitative analysis. Usable quantitative formulas have been derived for the special case of laminated sands and shales. This articel develops the general case for shaly sands.

2. TURNKEY PIPELINE . . . Minnesota Pipe Line Co.'s line from Clear Brook to Hastings is being constructed under a turnkey contract. This is believed to be the most comprehensive for any sizable pipeline in the United States. The 260-mile 16-in. line moves Saskatchewan crude to Great Northern Oil Co.'s 25,000-bbl. refinery, now under construction at Hastings.

3. REDUCED MAINTENANCE . . . Silicone-base paint can be used in the petroleum field to extend the life of protective coatings as much as 10 fold. In one application on gas engine mufflers and stacks, organic heat-resistant paint lasted 2 months. After repainting with silicone-base paints, no deterioration was noted after 15 months' service.

4. ECONOMICAL TURNAROUNDS . . . The expenditure of manpower and material on refining turnarounds accounts for about one-third of the maintenance costs of a refinery. This four-part discussion outlines procedure for more economical and more efficient turnarounds by focusing attention on (1) coordination in planning, (2) routine maintenance during turnarounds, (3) use of standards for cost control, and (4) organizing and scheduling procedures.

5. NEW TREND . . . Typical of the trend in modern pipeline design methods is the new 16-in. 295-mile products carrier of Wolverine Pipe Line Co. With its very high-speed centrifugal pumps, turbocharged engines, remote-control facilities, and safety shutdown devices, the system promises to be one of the most efficient of products carriers.

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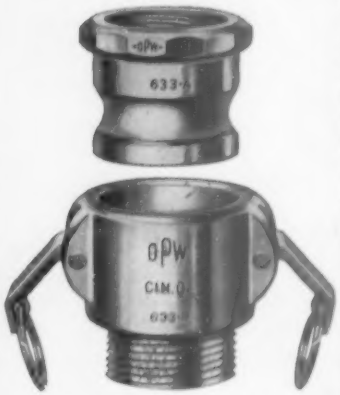

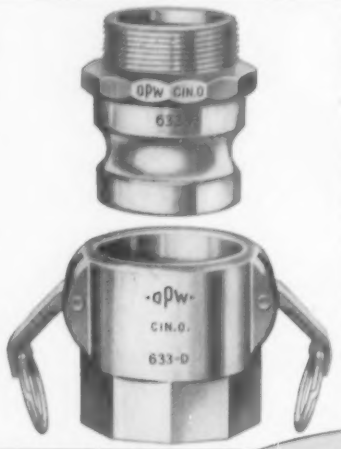

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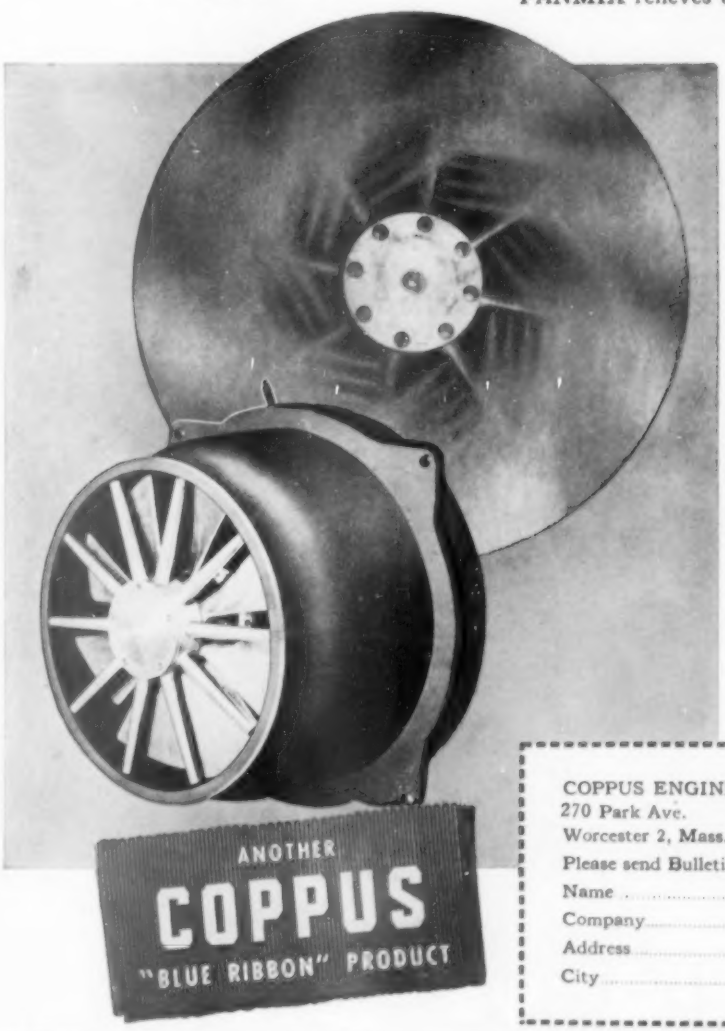

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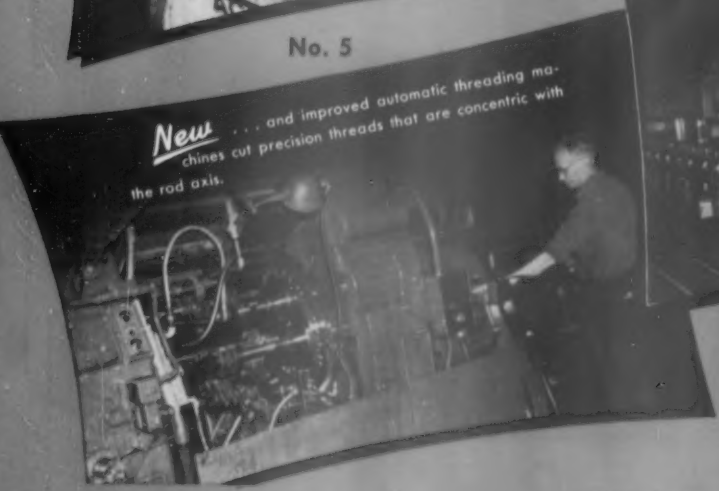

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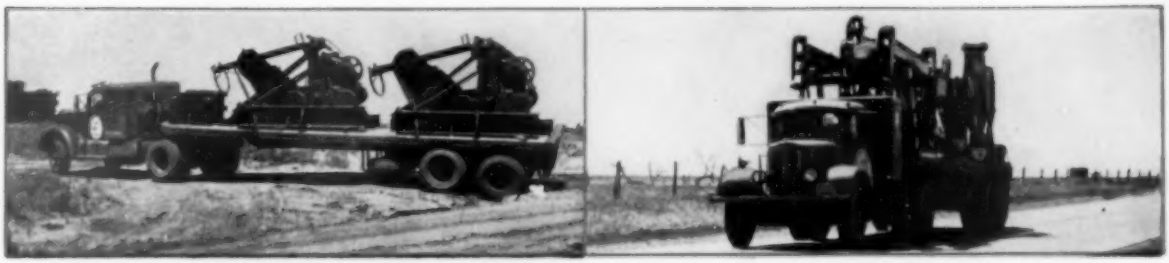

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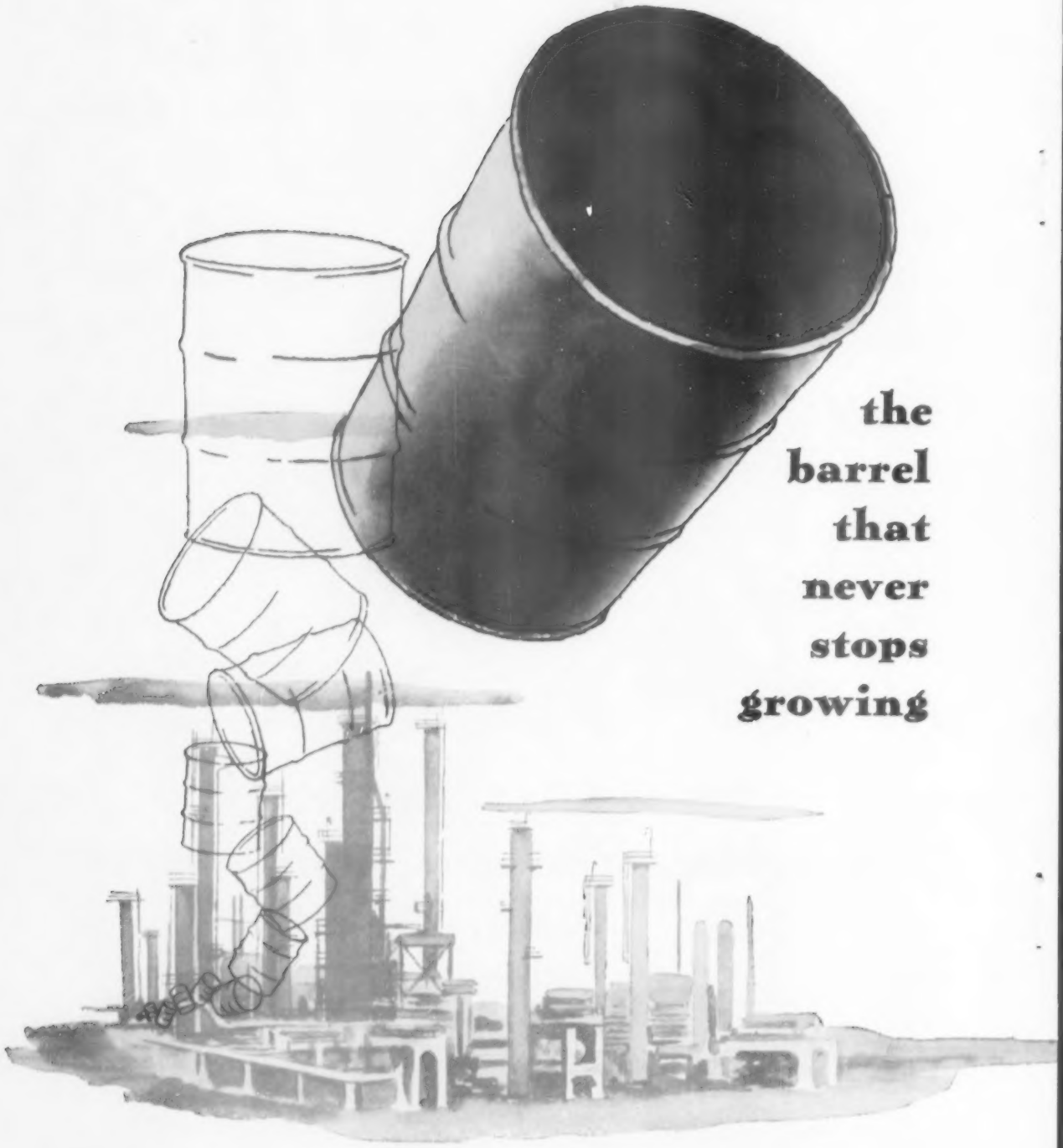

the barrel that never stops growing

Since the discovery of oil, the petroleum refining industry has been constantly squeezing more and more useful products from every barrel of crude. The success of its work is best evidenced by the comparison of product recovery during the early days of refining with the volume of products now being obtained from today's barrel of petroleum.

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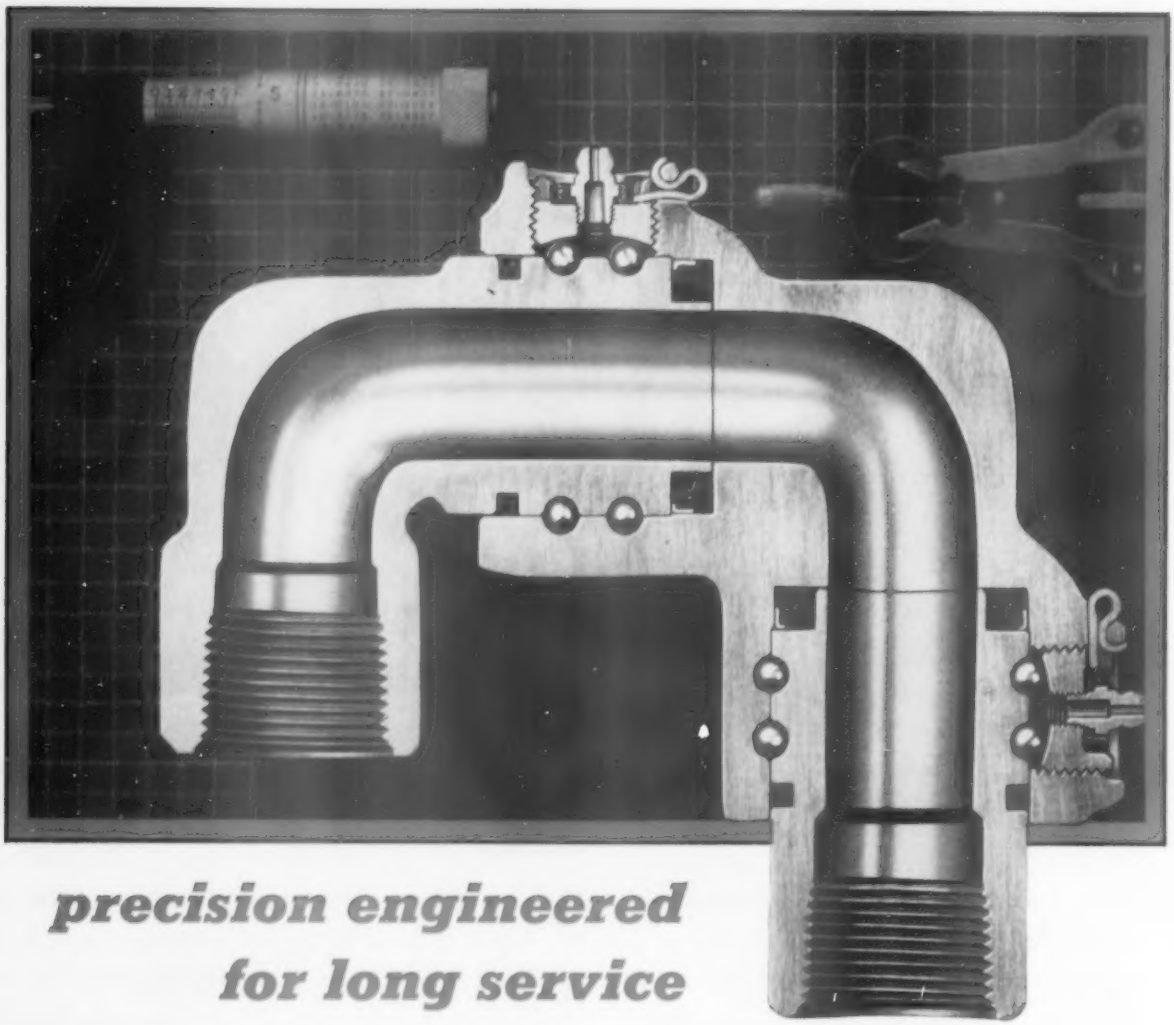

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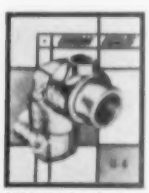

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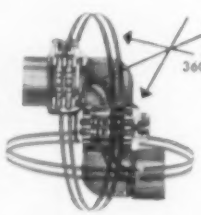

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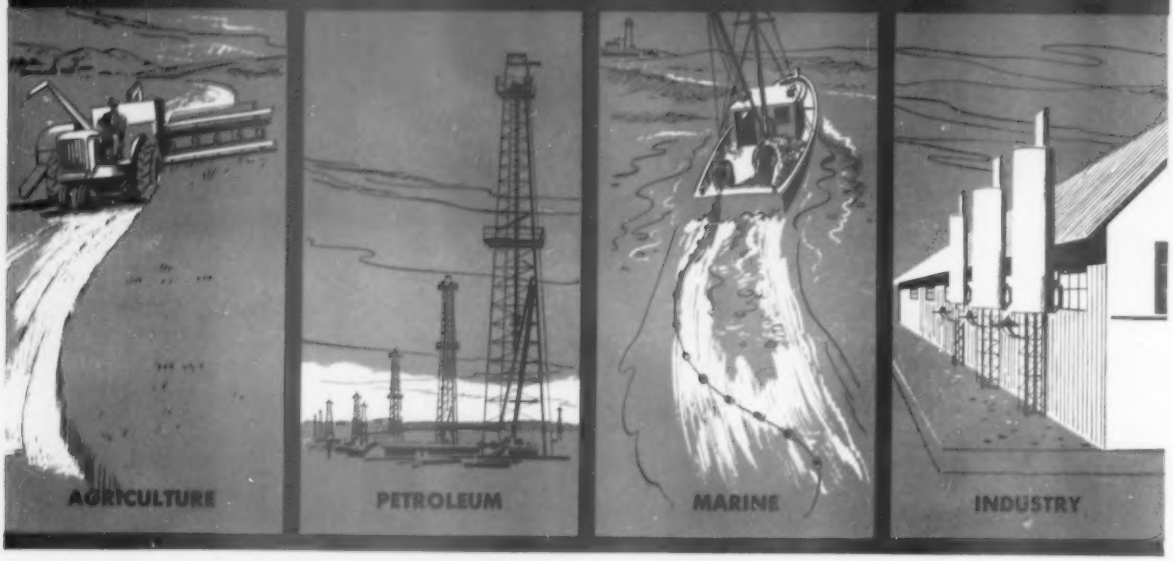
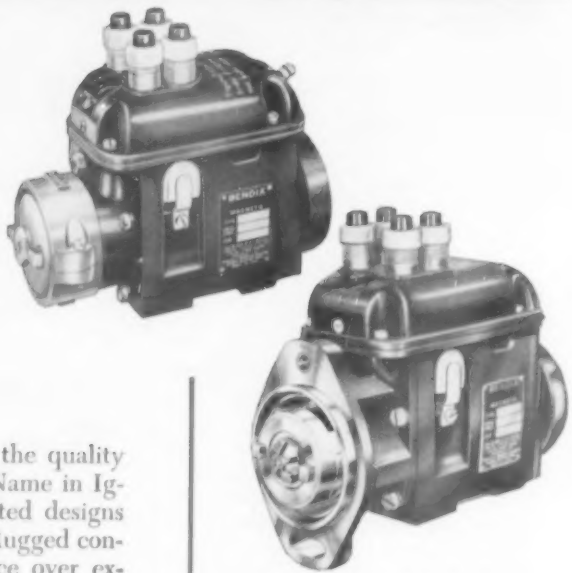


specify Bendix PA and PAF series magnetos



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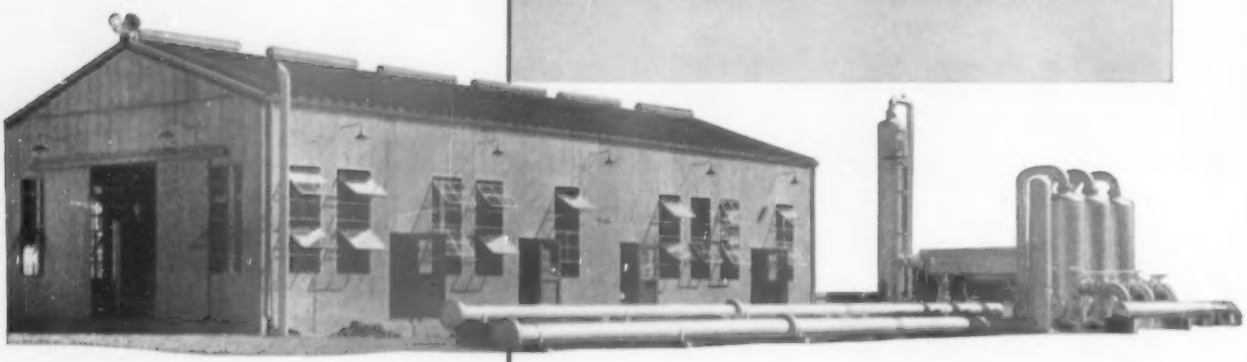

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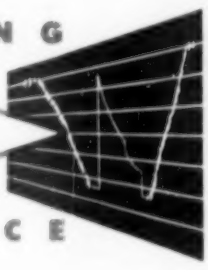

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for VERSATILITY *and*

To Almost Any FIELD TREATING PROBLEM

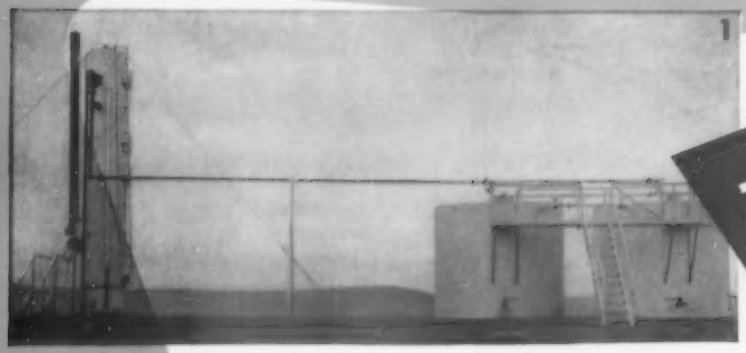


Photo 1 shows a Type "S" Treater being used as an atmospheric vessel—that is, with no water, oil or gas valves required—because there is no gas in the formation being produced. Commercial fuel gas is used for firing the treater. The overhead flow line from treater to stock tanks is slightly inclined to assist the flow of the low gravity Arbuckle oil, especially during cold weather.

Photo 2 shows a Type "S" Treater being used in low pressure service with water, oil and gas valves installed—but still using an inclined overhead flow line from treater to tanks, because the small amount of gas in this formation is separated by the treater and is used for fuel gas. This set-up is used many times when initial wells come in without gas, and subsequent wells produce gas. The treater is originally installed as an atmospheric unit, and is later equipped with valves to handle gas found in subsequent drilling.

Conversely, some areas may have 2 or 3 million feet of gas flow when drilled in, but due to the small reserve, the gas supply is depleted in a relatively short time. In these circumstances, it is a common practice to install valves on an inclined flow line from the treater. This makes it possible to handle large amounts of gas when wells are first drilled. As the gas is depleted, the valves are removed and the treater is used as an atmospheric unit.

Photo 3 shows a 4' x 21' Type "S" Treater in conventional service with water, oil and gas valves installed near the ground. Because of sufficient gas pressure and reserves, and because the oil is of high gravity and does not present a flow problem, the flow line is underground with a riser line at the stock tanks.

This unit has been handling 20 bbls. of flowing oil per hr. @ 90° F. rise in temperature, with approximately 2MM-SCF of gas per day. Pipe line oil has been produced *without interruption* since the well was opened. Other nearby operators with the same conditions who installed separators, heaters and flow tanks at considerably higher initial cost were *not able* to continuously produce pipe line oil. They later found it necessary to re-equip with flow treaters.

ADAPTABILITY...

....Specify the BS&B Type "S" EMULSION TREATER!

The BS&B Type "S" Emulsion Treater is one of the most versatile and adaptable treaters ever built for handling a wide range of field treating problems, because of the simple field modifications which can be made to adapt it quickly and inexpensively to local operating conditions!

It can be operated:

1. With or without water, oil and gas valves (as a pressure or an atmospheric unit).
2. With inclined overhead flow line, or with underground flow line.
3. With up to 6 ft. of hay filter section, or without hay filter section.
4. Without firebox, but with hay filter section (for heatless treating).

During the past five years, this unit has performed with outstanding success in all sections of Kansas, as well as in other widely varying locations, under the following range of conditions:

1. 17° API dead Arbuckle Oil w/1.004 Salt Water. (This oil congeals at high temperature.)
2. 19° API Kansas City Oil w/entrained gas and 1.005 Salt Water.
3. 42° API and over w/gas — (difficulty caused by small quantities of water, flow-cut into the oil.)
4. Mixtures of low gravity Arbuckle Oil and high gravity Kansas City Oil, or vice versa.

If you'd like more information on the BS&B Type "S" Emulsion Treater, or on any other item of BS&B Oilfield Production Equipment, call your BS&B Representative or write to...

BLACK, SIVALLS & BRYSON, INC.
Oil & Gas Equipment Division, Dept. 1-A9A
1708 West Main Street — Oklahoma City, Okla.

EFFICIENCY OVER 60 YEARS BS&B RELIABILITY

• ADVERTISEMENT • PREPARED BY JOHNSTON TESTERS, INC.

JOHNSTON drill stem testing NEWS

Items of interest to the members of the oil industry

SEPTEMBER 1954

JOHNSTON SCORES ANOTHER FIRST!

New, Field-Proven BOB TAIL PACKER and HYDRAULIC TESTER Assure More Successful Tests

This Super-Accurate Testing Team gives more reliable drill stem tests than ever before possible—try it, see the difference it makes—faster going in the hole—faster coming out and a big increase in successful, conclusive tests.

NEW BOB TAIL PACKER

. . . proved perfect in hundreds of tests in the field, completely prevents extrusion or flow of the rubber packing! Here's how it works:

1 **Up to 3 Times More Clearance is possible** when going into the hole! The Bob Tail Packer can effectively use a smaller diameter rubber for extra clearance because there's no loss of rubber volume to extrusion!

2 **Pack-Off Is Up To 30% More Effective** since metal petal cups at base of packer **hold** the rubber in the pack-off zone!

3 **Removes Easily From The Packer Seat** after the test because the rubber is supported and contained in the pack-off zone. The assembly is removed intact.

Type B HYDRAULIC TESTER

. . . prevents shock to formation, pipe and instruments and needs less water cushion!

Releases Pressure Slowly below the packer, thereby preventing shock to the test zone! The Type B Hydraulic Tester opens smoothly in stages during 2½ to 4 minutes! It's easy to spud through tight spots that may occur in open or uncased holes!

Positive Operation, Positive Interpretation! The compact, self-contained Johnston Hydraulic Tester opens easily by applying drill pipe weight, closes simply by removing weight! Functions accurately—reduces plugging and damage to wall of hole!

For The Accurate, Reliable DST service that you want, call Johnston Testers—the leader in new and improved DST technique since 1927.

JOHNSTON TESTERS

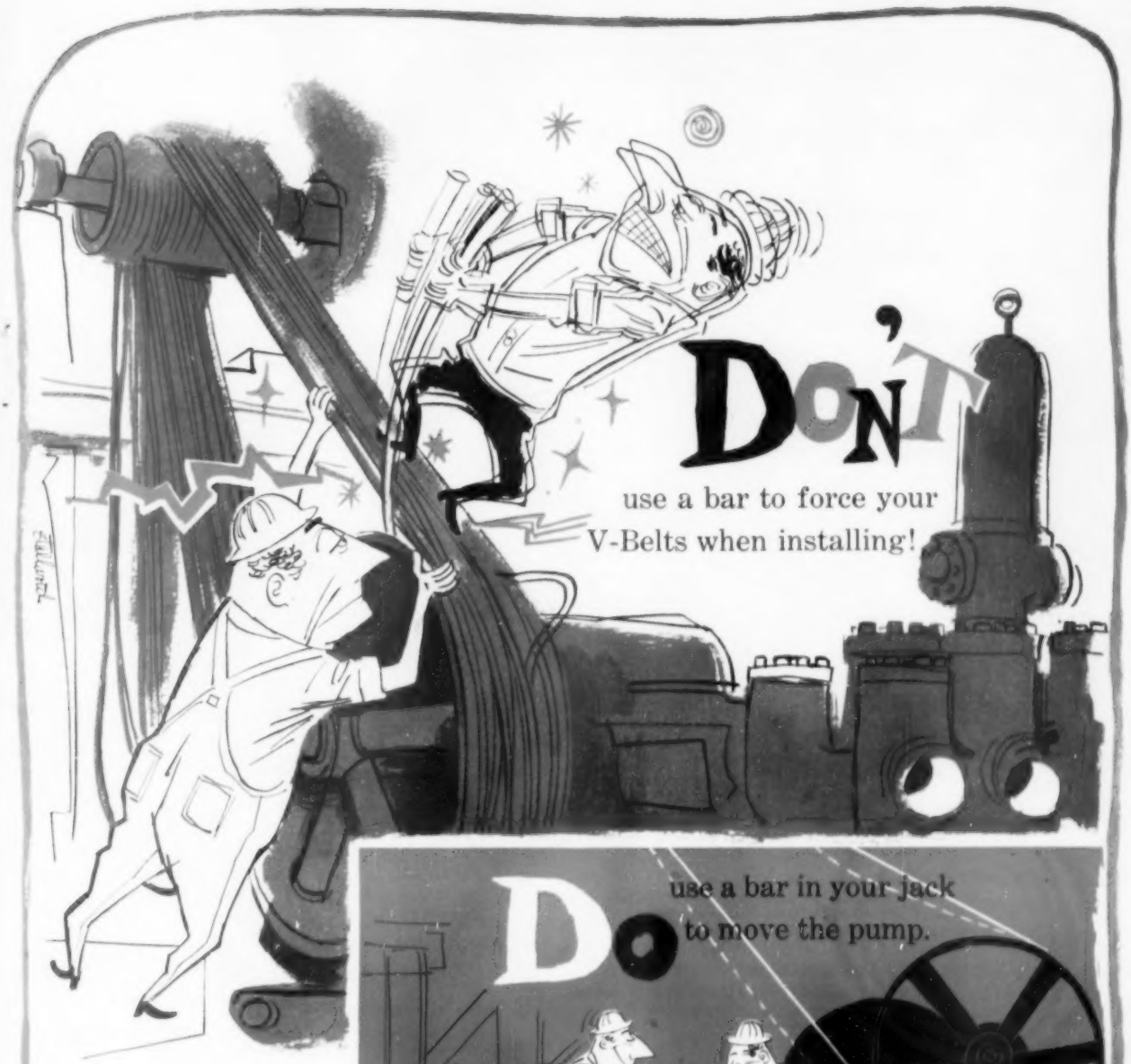
first in drill stem testing

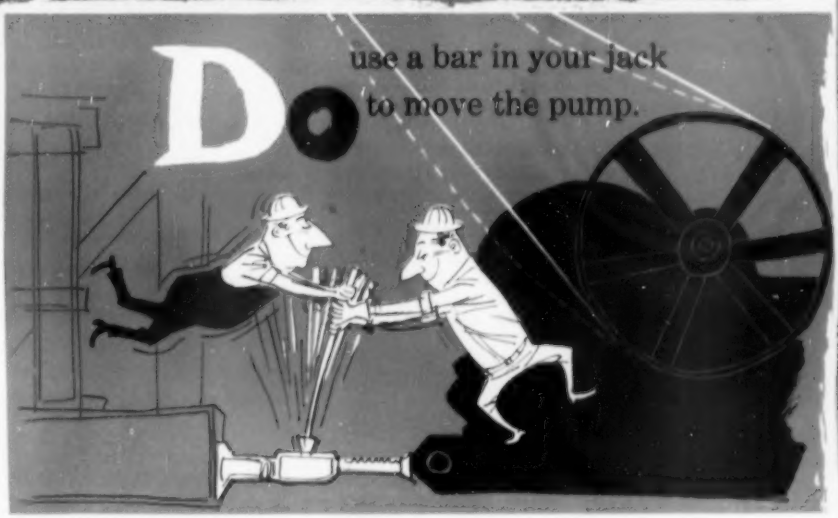
HOUSTON, TEXAS

LOS ANGELES, CALIF • CALGARY, CAN.

CO-541

FORMATION AND CASING TESTING — JOHNSTON

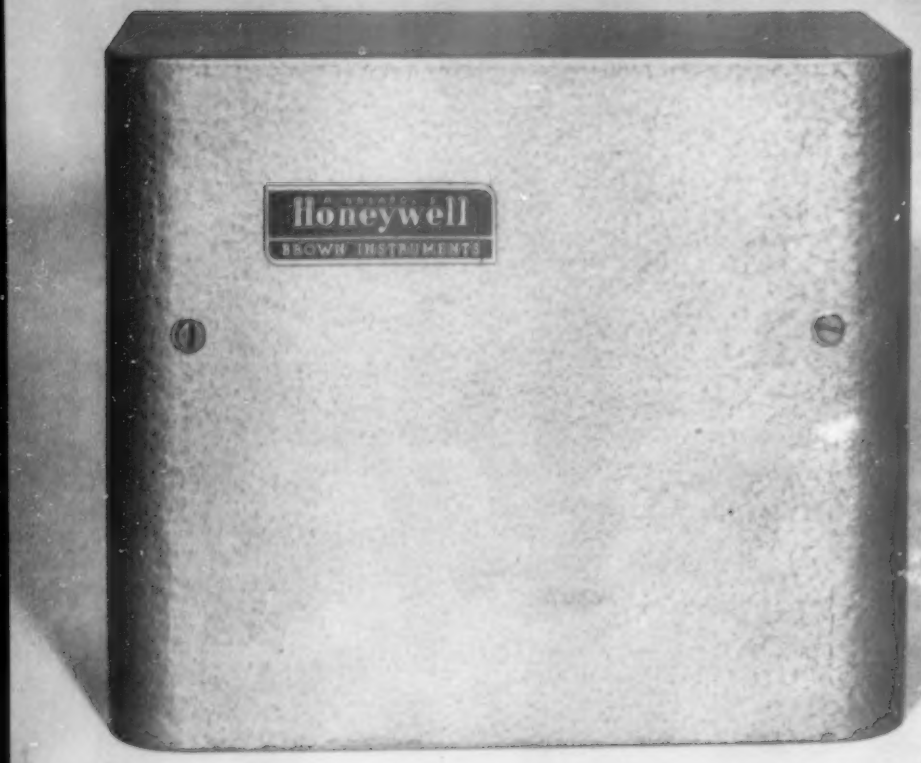


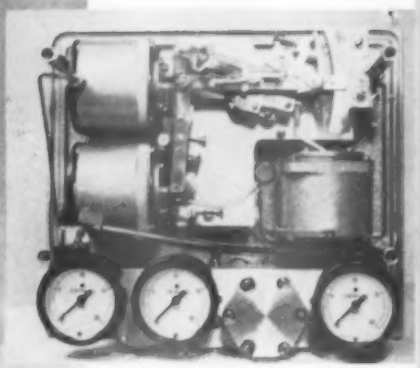


● . . . and, for best mud pump drive performance install Test Special V-Belts; stocked in matched sets by all Continental Stores.

CONTINENTAL
Serving the Oil and Gas Industries

NEW YORK BELTING & PACKING CO. Founded 1846





Interior view of Ratio Relay shows simple, compact construction. Pressure gages indicate input signals and output pressure. Adjustments for control action, zero setting and ratio range are readily accessible.

The Tel-O-Set Ratio Relay offers these unique features:

★ **LINEAR RATIO**

Output changes in straight-line relation with primary variable. Permits better control tuning . . . eliminates "compromise" settings.

★ **DIRECT OR REVERSE ACTION**

Readily set to provide either increasing or decreasing output . . . increasing or decreasing ratio.

★ **FLEXIBLE ADJUSTMENT**

Ratio range can be reduced to any desired value. Reduced span can be positioned at any desired portion of the maximum range. Factory setting is 50—150% ratio range.

★ **WIDE RANGE**

Ratio can vary from 0 to 200% for a full scale change in the primary variable.

★ **ADJUSTABLE LIMITS**

Readily set stops are provided to limit minimum and maximum output pressure.

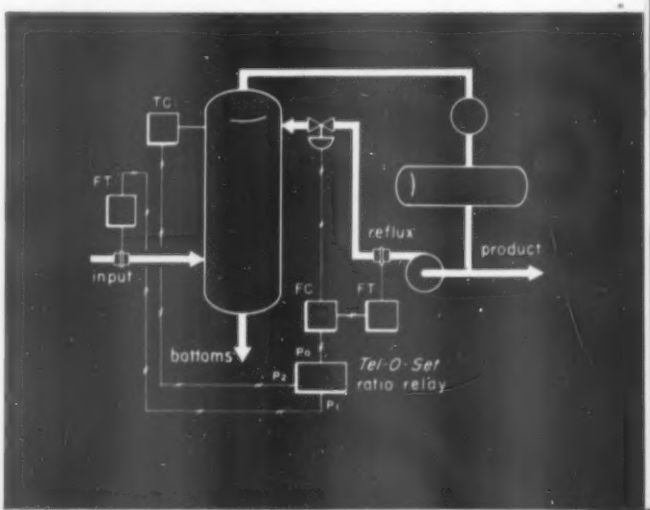
★ **ZERO SUPPRESSION**

Independent zero adjustments permit selection of the exact input-output relationship desired.

★ **INDICATING GAGES**

Separate indicators show output pressure and both input pressures.

On a distillation column, Tel-O-Set Ratio Relay receives air signal (P_2) from column temperature controller. This signal varies the ratio of the output pressure (P_0) to the signal received (P_1) from the input flow transmitter. Output pressure feeds into an *Indexet* remote setting index in the flow controller, to reset this instrument and thus throttle the valve in the reflux line. Ratio of reflux to input is thus varied in accordance with temperature of the top of the column.



New, versatile means for effecting cascade control

the Tel-O-Set Ratio Relay

HAVE a complex control loop? Here's a versatile way to simplify it . . . the new *Tel-O-Set* Ratio Relay. Another advanced idea in process control from Honeywell, this unique relay proves the ideal solution to complex cascade control problems.

The Ratio Relay provides automatic control with a single element influenced by three interrelated variables. For example, it is used on distillation columns (see diagram) to control the ratio of reflux to feed, as column temperature varies. In absorption towers, it regulates ratio of absorbent and feed stock to give constant concentration of product. And there are scores of other uses for this relay . . . in evaporators, controlled-atmosphere furnaces, reaction tanks, engine testing and other applications where several related variables must be interlocked for efficient operation.

The Ratio Relay receives pneumatic signals from remote transmitters, controllers or manual loading stations. It produces an output air signal for readjusting the set point of a secondary controller. It is the ideal companion for Honeywell Differential Converters, *Tel-O-Set* miniature instruments and Brown pneumatic controllers.

Your nearby Honeywell sales engineer will be glad to discuss applications to your specific process . . . and he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.

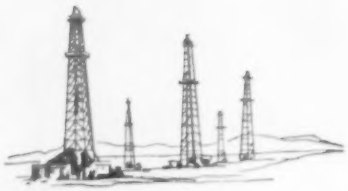
● **REFERENCE DATA: Write for Bulletin 8410, "*Tel-O-Set* Ratio Relay."**

MINNEAPOLIS **Honeywell**

BROWN INSTRUMENTS

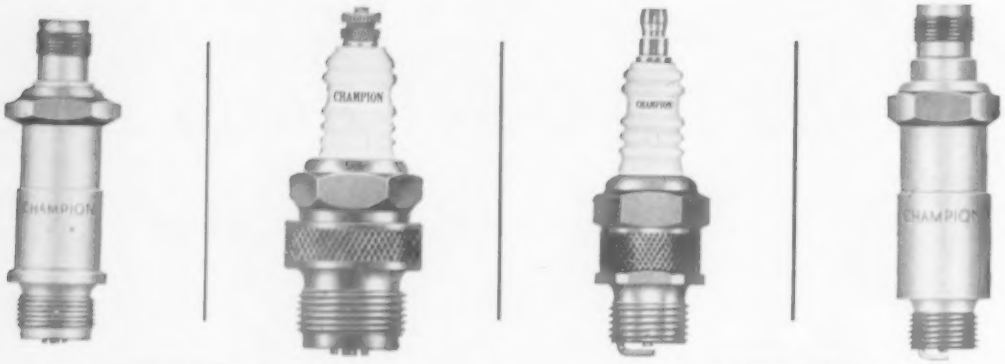
First in Controls

CHAMPION

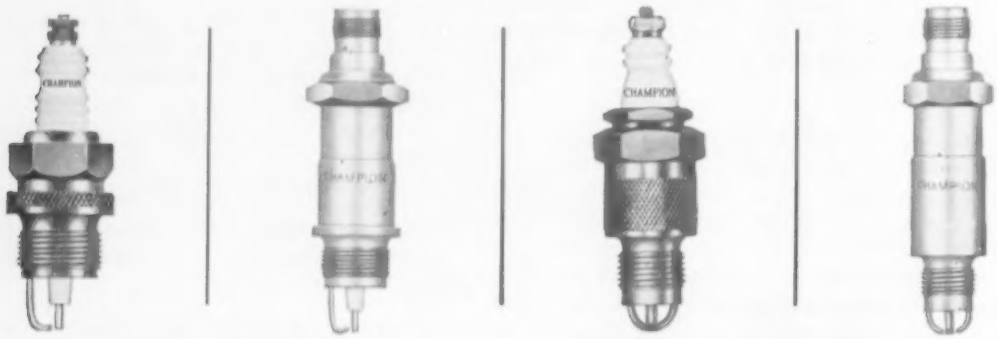


INDUSTRIAL AND OIL FIELD SPARK PLUGS ARE ENGINEERED AND BUILT BETTER TO

Do a Better Job for You!



E-901 GAS ENGINE 901 6 COM. GASOLINE UNITS E-6 COM.



44 DIESEL STARTING E-44 D-8 HESSELMAN ED-8

Shielded or unshielded to best suit your safety requirements, Champions are precision engineered for the specific job and have earned a reputation for long, trouble-free service life under the toughest conditions.

Only Champion offers a complete line of spark plugs for all industrial and oil field engines, gasoline, natural gas, Hesselman and diesel.

BEST FOR ANY ENGINE

CHAMPION

SPARK PLUGS

CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO

If it can be jacked...

one of these will do the job faster and easier

No. 516-MT	"The Roustabour" No. 1523	No. 1022	No. 2028
5-TON CAPACITY	15-TON CAPACITY	10-TON CAPACITY	20-TON CAPACITY

For Better Service—Duff-Norton maintains complete stocks of jacks of all kinds—ratchet, screw and hydraulic—in *the only jack warehouse in the oil country* at 209 West First Street, Odessa, Texas. Phone 6-3021.

The job will always go faster and easier when you use the correct jack for the job at hand. These rugged, dependable, powerful Duff-Norton jacks are designed and built for years of trouble-free service.

All contain the exclusive, patented, Duff-Norton spring mechanism that assures safe, positive action in lifting or lowering. All have sturdy foot lifts for getting a toe-hold under low set loads.

All are available from your favorite supply store. For complete information on these and many other Duff-Norton Jacks, write the world's oldest and largest manufacturer of lifting jacks for special Oil Field Jack Bulletin, AD 19-B, the Duff-Norton Manufacturing Co., P. O. Box 1889, Pittsburgh 30, Pa. Canadian plant—Toronto 6, Ont.

DUFF-NORTON *Jacks*

"Giving Industry a Lift Since 1883"

COLLINS

Microwave Systems

simplified by Mechanical Filters

COLLINS Frequency Division Multiplex equipment employs Mechanical Filters to provide bilateral single sideband suppressed carrier multiplex channels.

This type of multiplex has been well proven over the years by the telephone industry, but the advantages of SSB were often off-set by the high cost and limited selectivity of the tuned filter used to select the sideband.

The invention and commercial development of the Mechanical Filter by the Collins Radio Company has provided a practical, economical and reliable means of obtaining SSB with improved selectivity.

The Mechanical Filter provides a flat-topped bandpass response and steep skirts equivalent to a 5-stage IF strip. Unlike conventional tuned strips, the Mechanical Filter is inherently stable and reliable. The skirts are sufficiently steep to provide adequate selectivity for use of bilateral SSB channels.

This multiplex system permits several economies in equipment and its manufacture. One basic 250 kc generator serves all multiplex units, and one channeling frequency strip is required for each two duplex channels. Standardization on two Mechanical Filter types and resultant manufacturing economy is achieved by positioning the channels in the video baseband.

Collins' microwave communications equipment employs unit type construction to permit maximum installation flexibility to meet a user's specific needs. All equipment may be mounted back-to-back on standard relay racks. Articulated swing-out hinges permit access to rear of units. Advanced design incorporating modern construction practice, together with conservatively operated components, assures maximum reliability.

COLLINS

COLLINS RADIO COMPANY

CEDAR RAPIDS, IOWA

261 Madison Ave., NEW YORK 16
1930 Hi-Line Dr., DALLAS 2
2700 West Olive Ave., BURBANK
Collins Radio Company of Canada, Ltd.,
74 Sparks Street, OTTAWA, ONTARIO

MAIL THIS COUPON for complete details on Collins Microwave equipment.

COLLINS RADIO COMPANY, Cedar Rapids, Iowa

Gentlemen: Please send me complete details on your microwave equipment.

Name _____

Company _____

Address _____

City _____ State _____

Systems Engineer inspects a Collins Multiplex modulator-demodulator unit. The unit uses two Mechanical Filters to select the upper and lower sideband associated with a single sub-carrier.

This Collins microwave installation has two main relay RF equipments, multiplex equipment and test equipment on the racks at left. Standby RF equipment and additional multiplex equipment are mounted on the rear of these racks. The terminating equipment, standby power plant and auxiliary apparatus are shown on the right. The entire installation is neat, uncluttered and efficiently arranged. It contains 24 channels of Collins bilateral SSB suppressed carrier multiplex (in 300 kc — 600 kc octave of videobase band) plus 12 channels on standard telephone SSB carrier equipment (below 300 kc in video baseband), both operating over a 6700 mc link provided by Collins microwave equipment.

Maintenance routine for this multi-channel microwave station is simplified by microwave test apparatus built in Collins' RF unit. Here a routine measurement of mixer crystal front-to-back ratio is made with the microwave system in operation.

Level-setting and multiplex maintenance in this 32 channel microwave station is facilitated by a transmission measuring set. A continuous recorder provides performance measurements over the entire system.

NEW CHEVROLET TRUCKS

shorten your schedules and cut costs in the bargain!

You can actually count on a Chevrolet truck doing your job faster and for less money. That's a strong claim, sure; but one that's been proved time after time on job after job.

EXTRA POWER SAVES YOU TIME

All three Chevrolet truck engines—the "Thriftmaster 235," the "Loadmaster 235" and the "Jobmaster 261"*—deliver extra horsepower for greater acceleration and hill-climbing ability. You haul your loads on a time-saving schedule and save money doing it—for with Chevrolet's higher compression ratio you use less gas.

BUILT-IN RUGGEDNESS SAVES YOU MONEY

Stronger, more rigid frames, newly designed clutch; huskier rear axles and drive lines in 2-ton models; higher capacity universal joints in medium- and heavy-duty models—these beefed-up built-in chassis features mean your Chevrolet truck is going to stay on the job for a longer time. They also mean you can expect extra-low operating costs.

Another important advantage is Chevrolet's low original cost—lowest of all lines of trucks! You save the day you buy, and you go right on saving as long as you own that Chevrolet truck. Drop by your Chevrolet dealer's and look over the many models he has to offer. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

MOST TRUSTWORTHY TRUCKS ON ANY JOB! CHEVROLET

CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

THREE GREAT ENGINES—The new "Jobmaster 261" engine* for extra heavy hauling. The "Thriftmaster 235" or "Loadmaster 235" for light-, medium- and heavy-duty hauling. **NEW TRUCK HYDRA-MATIC TRANSMISSION***—offered on ½-, ¾- and 1-ton models. Heavy-Duty **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting. **DIAPHRAGM SPRING CLUTCH**—improved-action engagement. **HYPOID REAR AXLE**—for longer life on all models. **TORQUE-ACTION BRAKES**—on all wheels on light- and medium-duty models. **TWIN-ACTION REAR WHEEL BRAKES**—on heavy-duty models. **DUAL-SHOE PARKING BRAKE**—greater holding ability on heavy-duty models. **NEW RIDE CONTROL SEAT***—eliminates back-rubbing. **NEW, LARGER UNIT-DESIGNED PICKUP AND PLATFORM STAKE BODIES**—give increased load space. **COMFORTMASTER CAB**—offers greater comfort, convenience and safety. **PANORAMIC WINDSHIELD**—for increased driver vision. **WIDE-BASE WHEELS**—for increased tire mileage. **BALL-GEAR STEERING**—easier, safer handling. **ADVANCE-DESIGN STYLING**—rugged, handsome appearance.

**Optional at extra cost. Ride Control Seat is available on all cabs of 1½- and 2-ton models, standard cabs only in other models. "Jobmaster 261" engine available on 2-ton models, truck Hydra-Matic transmission on ½-, ¾- and 1-ton models.*

SERVICE...

plus EQUIPMENT you can depend on

Check this list of our suppliers. All of them are big names in the oil industry. We have bought from many of them for 25 years or more because *we are sure of their quality products and have confidence in their generous guarantees.*

For SERVICE plus EQUIPMENT you can depend on, see IVERSON SUPPLY for all your Drilling, Production and Refinery Equipment.

A PARTIAL LIST OF OUR SUPPLIERS

- ✓ Alten Ideco Pumping Units
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- ✓ Brewster Company, Inc.
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OFFICES: FORT WORTH, TEXAS

IVERSON SUPPLY COMPANY

DRILLING-PRODUCTION AND REFINERY EQUIPMENT

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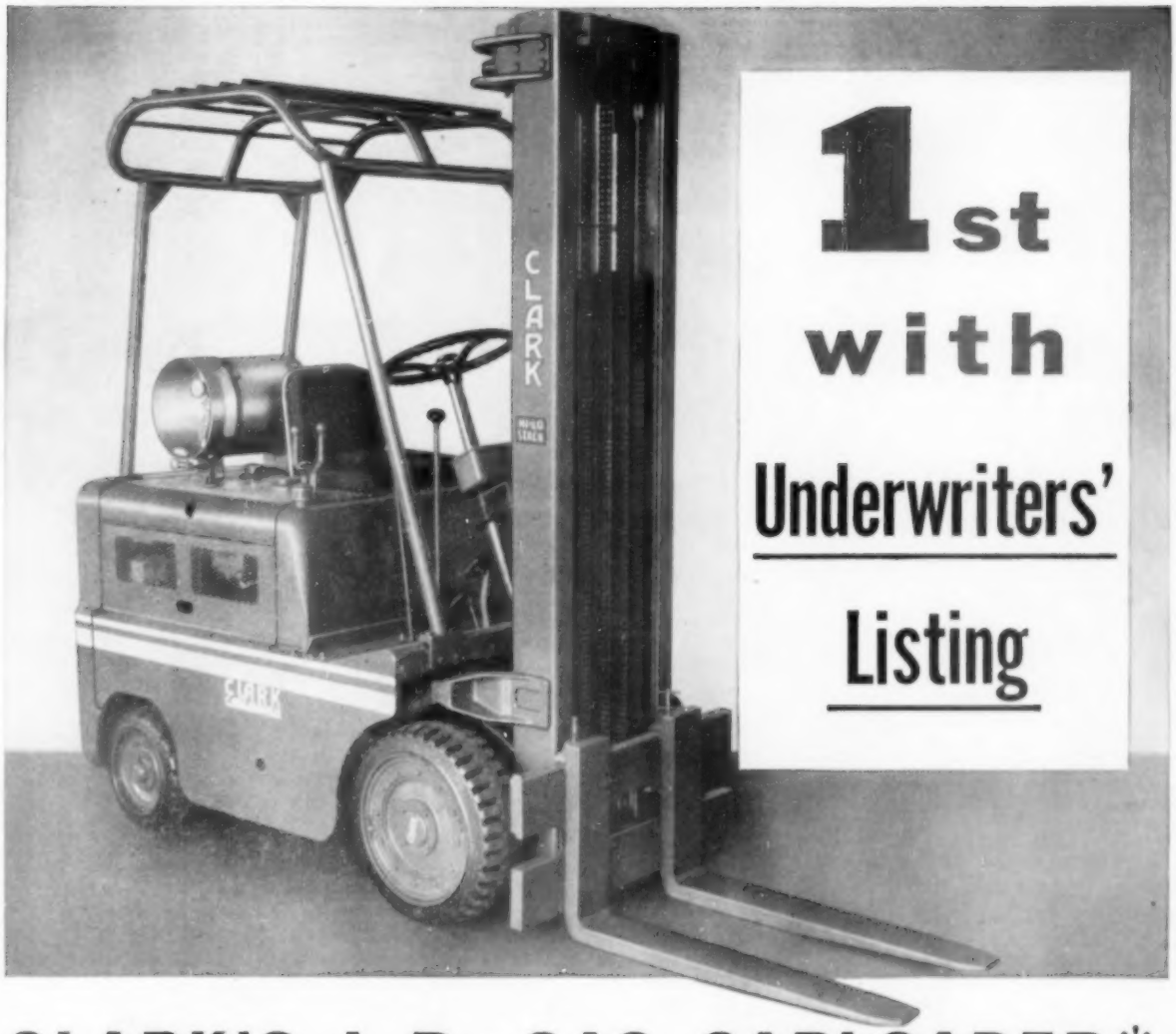


CLARK'S L.P.-GAS CARLOADER*

reduces engine maintenance, eliminates obnoxious exhaust fumes

1. Greatly reduces engine maintenance:

———eliminates unburned carbon deposits and crankcase dilution.

———eliminates fuel pump and complicated carburetor adjustments.

2. Eliminates obnoxious exhaust fumes:

———L.P.-Gas provides almost perfect combustion, excellent for indoor operations.

3. Provides safe, efficient operation:

———vacuum ignition switch is interlocked with fuel line and manifold, impossible to spill fuel or load-up engine.

———high compression head (8.5 to 1) gives maximum economy and power from high octane L.P. Gas.

———quickly demountable tank takes 3 minutes to change.

———Stellite valves and seats prevent burning from high flame temperature of L.P. Gas.

*4000 lb. capacity, available with standard shift, Hydratork or Dynatork.

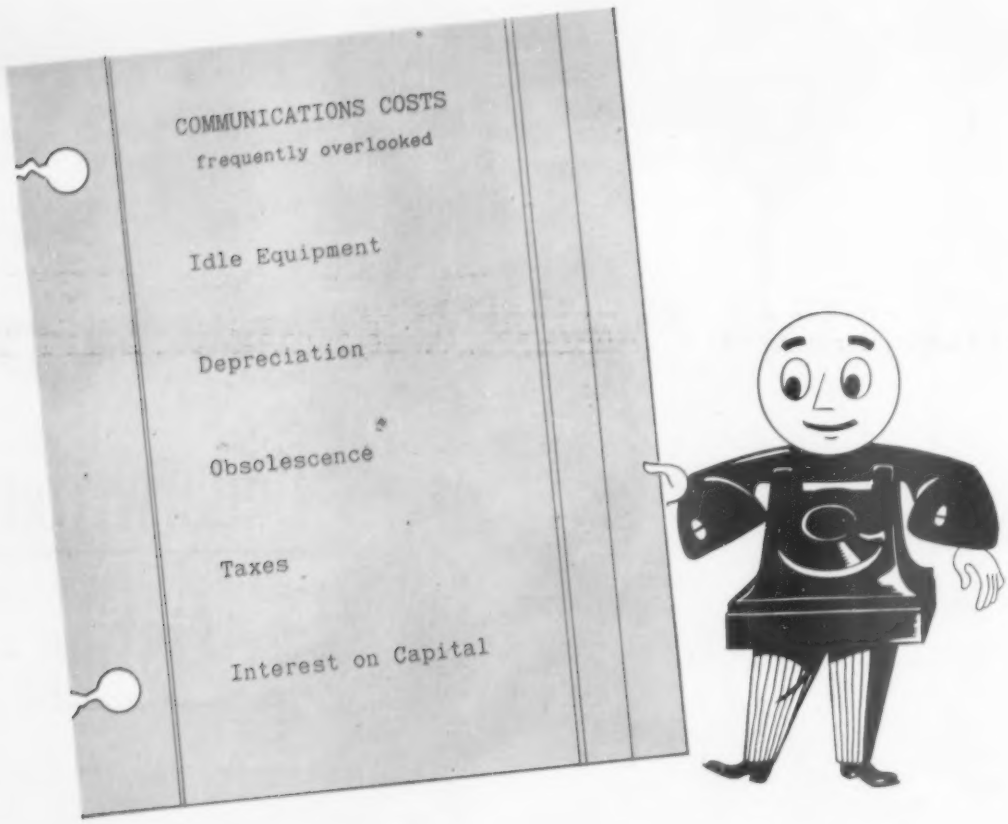
Now you can have the advantages of liquified petroleum gas-powered (butane, propane) materials handling, with complete safety. The Clark L.P.G. Carloader is the first lift truck to receive the all-important listing of Underwriters' Laboratories. Field and factory tested for two years, Clark's unit is specifically designed and metered for fork truck operation. For details, call your local Clark dealer, listed under "Trucks, Industrial" in the Yellow Pages. Or send the coupon for specifications.

CLARK EQUIPMENT

Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek 150, Michigan

☐ Send details on LPG truck

Name_____
Firm_____
Address_____
City_____



BELL SYSTEM TAKES THE HIDDEN COSTS OUT OF YOUR COMMUNICATIONS

The first cost isn't the last cost, when you provide your own communications. Many of the continuing costs are buried deep in idle equipment, taxes, depreciation, loss of interest on capital.

Bell System gives just the service you need—at low cost. It's tailored to your operations today, and flexible to meet possible change tomorrow. Your Bell System communications are efficient and dependable, with new equipment and techniques constantly being developed to improve your service.

When you use Bell System communications, you get the benefits of trained personnel, expert supervision, continuing analysis. This high-quality service doesn't tie up capital but leaves your money free for income-producing investments in your business.

• • •

Your Bell Telephone Company will be glad to study your communications problems and needs without charge.

PRIVATE-LINE TELEPHONE

TELETYPEWRITER

MOBILE TELEPHONE

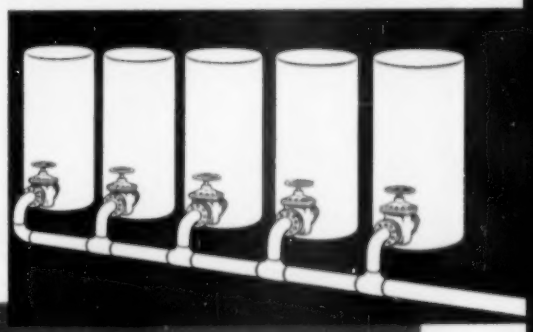
METERING CHANNELS

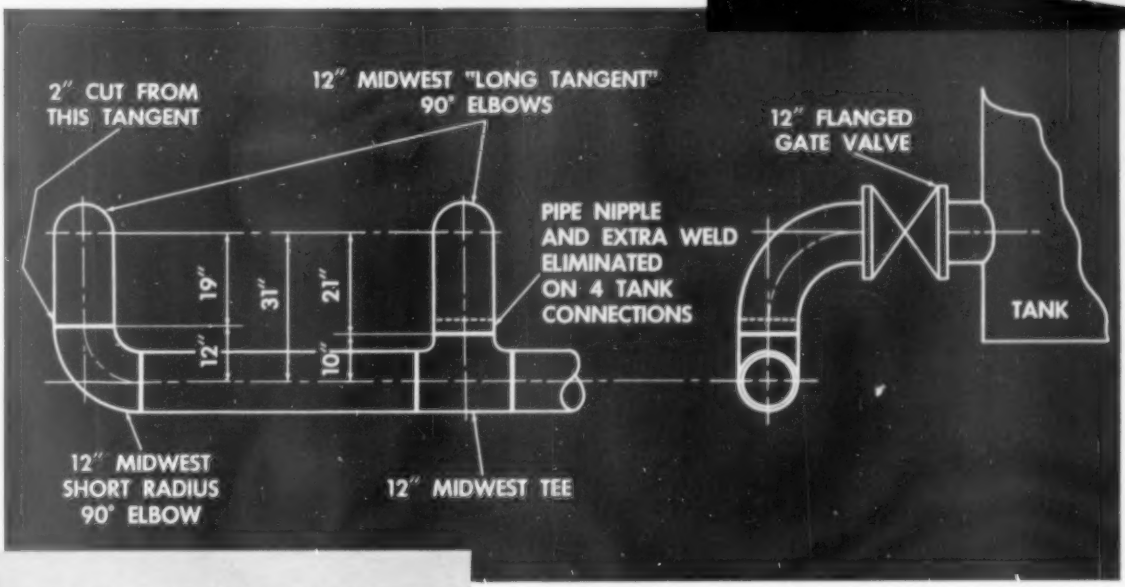
BELL TELEPHONE SYSTEM

MIDWEST "LONG TANGENT" ELBOWS

SAVED $156.20

On This Welding Piping





MIDWEST "LONG TANGENT" ELBOWS COST NO MORE THAN OTHER ELBOWS

The Problem:

To connect the five tanks shown in the sketch at top to a common 12" header.

The Difficulty:

The center-to-outlet dimension of the 4—12" tees is only 10", while the shortest elbow available measures 12" center-to-end. Thus, if standard long radius elbows are used next to the five tank valves, four short nipples and four extra 12" welds would be required.

The Solution:

By using Midwest "Long Tangent" elbows as shown in the blueprint, the expense of the four extra nipples and welds was eliminated at the cost of just one cut! The actual net savings made by "Long Tangent" elbows on this job was $156.20.

Remember—Midwest "Long Tangent" elbows cost no more than regular elbows! For further information, write for Catalog 54.

MIDWEST PIPING COMPANY, INC.

Main Office, 1450 South Second St., St. Louis 4, Missouri

PLANTS: ST. LOUIS, PASSAIC, LOS ANGELES, and BOSTON

SALES OFFICES: NEW YORK 7—50 CHURCH ST. • LOS ANGELES 33—520 ANDERSON ST.
BOSTON 27—426 FIRST ST. • CHICAGO 3—79 WEST MONROE ST.
TULSA 3—224 WRIGHT BLDG. • HOUSTON 2—1213 CAPITOL AVE.
CLEVELAND 14—616 ST. CLAIR AVE.

6829

MIDWEST WELDING FITTINGS IMPROVE PIPING DESIGN AND REDUCE COSTS

SIGNED, SEALED, AND DELIVERING

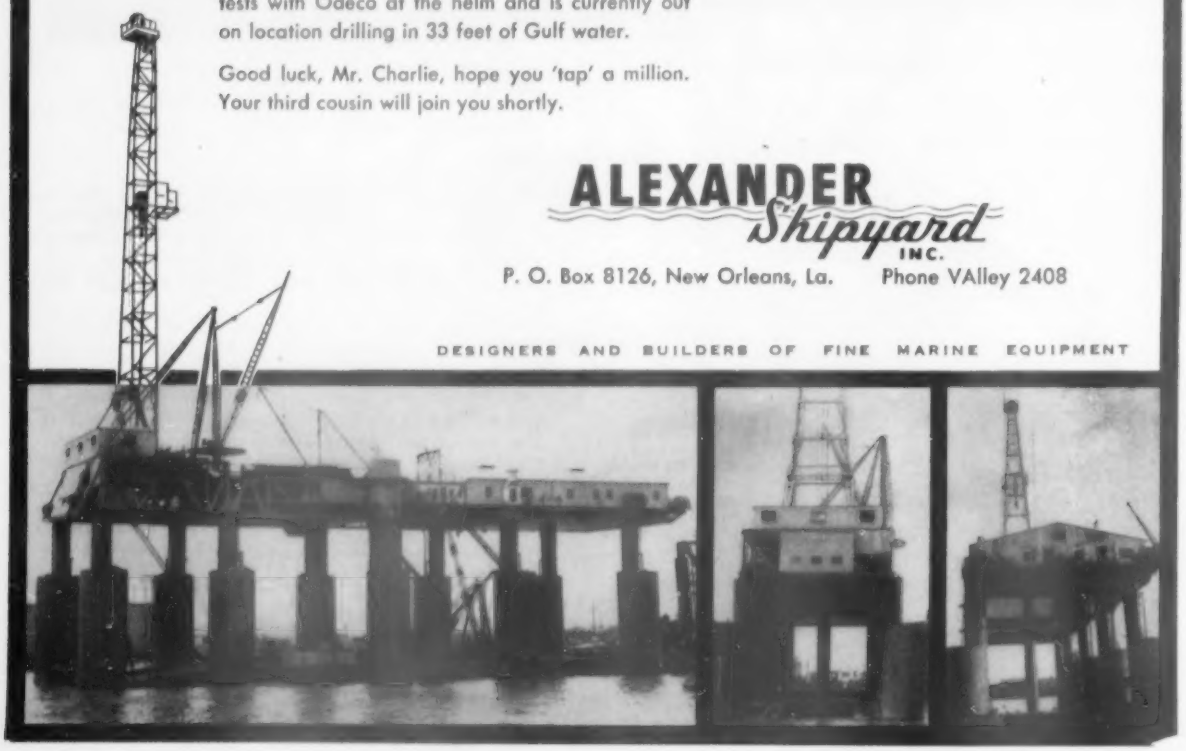
Mr. Charlie, Alexander's revolutionary deep-water drilling giant, eased through initial operational tests with Odeco at the helm and is currently out on location drilling in 33 feet of Gulf water.

Good luck, Mr. Charlie, hope you 'tap' a million. Your third cousin will join you shortly.

ALEXANDER Shipyard INC.

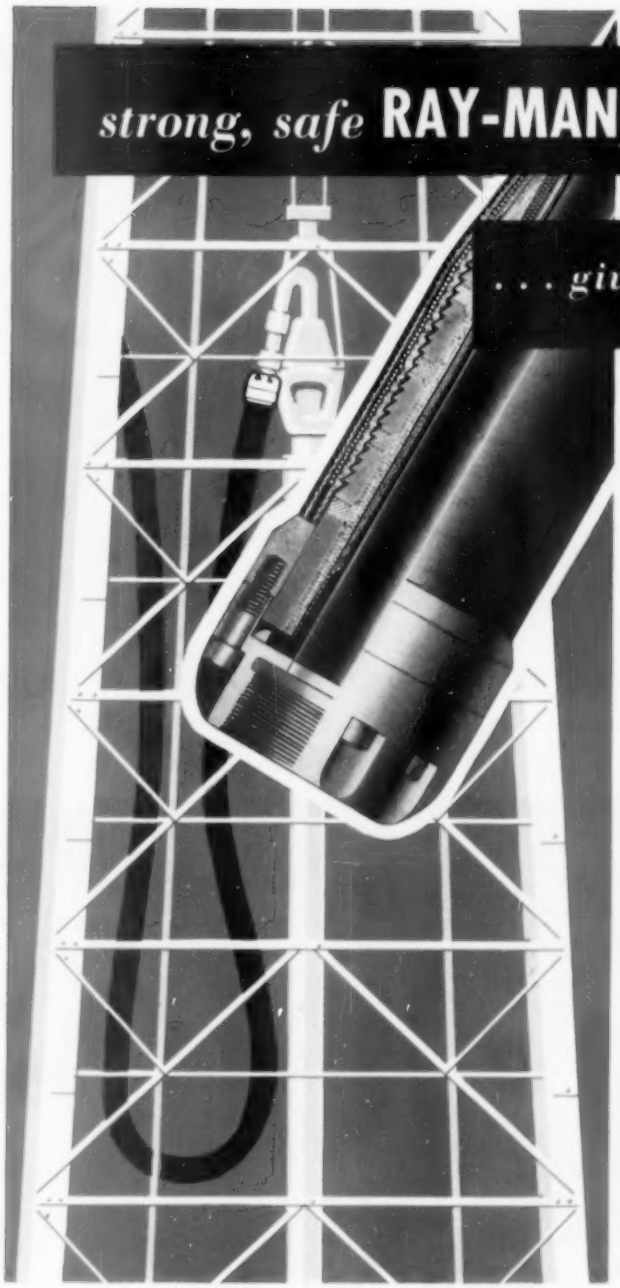
P. O. Box 8126, New Orleans, La. Phone VAlley 2408

DESIGNERS AND BUILDERS OF FINE MARINE EQUIPMENT



strong, safe RAY-MAN CBL ROTARY HOSE

. . . *gives you more use per dollar*



Manhattan hose engineers have developed a method of winding high tensile steel cable wires under precisioned tension to produce a rotary hose unequalled for strength, flexibility and safety. This special reinforcement makes Ray-Man CBL Rotary Hose easier to handle and make up on the rig. It has higher resistance to accidental crushing. The improved streamlined built-in coupling has blow-out proof "Lip-Lok" Seal that tightens under pressure for extra safety. These features add up to lower cost, trouble-free service under all drilling conditions . . . "More Use Per Dollar" with Ray-Man CBL Rotary Hose.

DISTRIBUTED BY NATIONAL SUPPLY COMPANY IN ALL PRINCIPAL OIL FIELDS

Write for your copy of Catalog 6903, describing the complete line of Raybestos-Manhattan rubber products for every phase of the oil industry; V-belts, transmission belts, oil-loading, and refinery hose.

RM

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

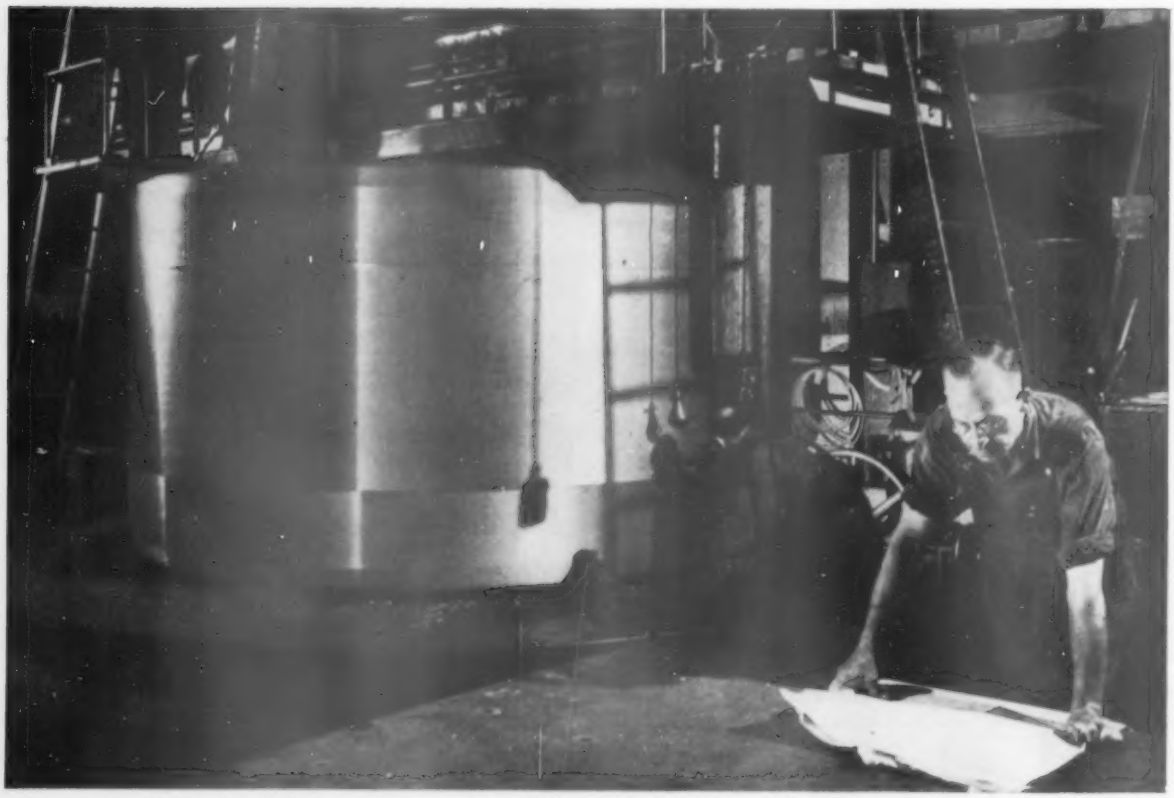
RAYBESTOS-MANHATTAN, INC.

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings
Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Bowling Balls

RM 4-10

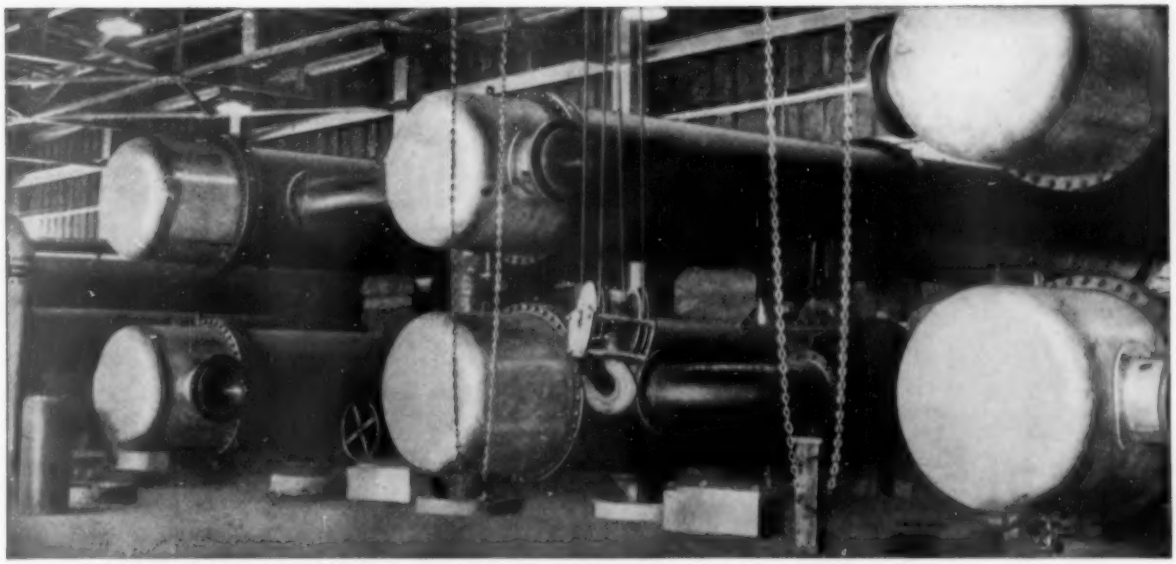
Profit-building answers to Modern

...examples of the wide variety of heavy-metal equipment designed and built by Alco to meet today's demands in petroleum and petrochemical processing . . . results of **Alco Experience** . . . gained through many years of designing and building heavy-metal equipment for refining and processing companies the world over . . . and **Alco Facilities** . . . capable of handling economically an extremely wide range of metal-fabricating operations . . . of meeting strictest customer specifications.



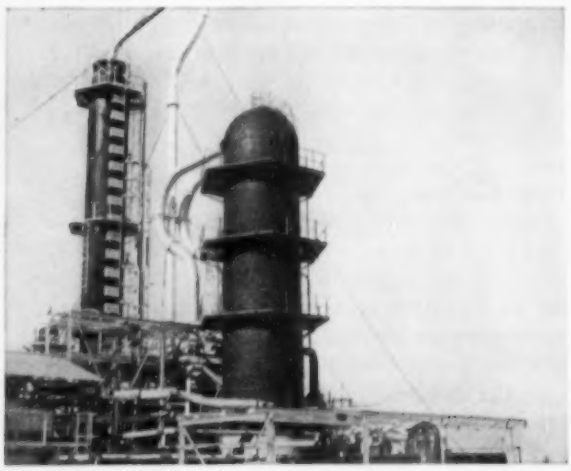
LARGE-DIAMETER BORING MILL, equipped with two rail heads and capable of handling work 25 ft 0 in. high, is typical of the complete, modern production facilities in Alco's shops which can produce virtually every type of heavy-metal equipment for the petroleum, chemical and power industries.

Processing problems



HEAT EXCHANGERS, built by Montreal Locomotive Works, Ltd., an Alco affiliate, ready for final piping in the Edmonton plant of The Canadian Chemical Company, Limited. Heads, tubes and tube sheets of these exchangers are fabricated of Type 316 stainless steel. MLW has supplied more than 200 heat exchangers and reboilers for this gigantic new installation.

AIR-COOLED HEAT EXCHANGERS were supplied by Alco for Celanese Corp., of America's new Pampa, Texas, plant. Mounted in 17- by 24-ft induced-draft housings, each cooling bank is equipped with two Monel fans supported on silicon rubber. Total heat dissipation from this specially engineered installation is 229,400,000 Btu per hr, a record for air-cooled condensers.



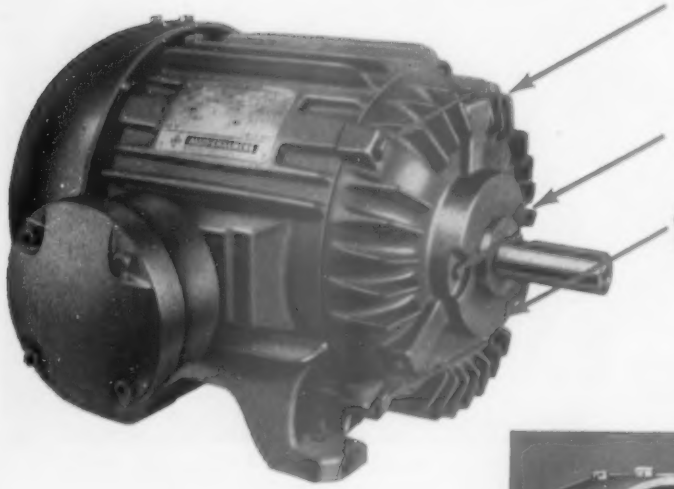
WORLD-WIDE USE of Alco equipment is typified by the wide range of Alco coolers, exchangers, condensers and heaters in service at the Aquila refinery in Trieste, Italy. Operating on Middle Eastern crudes, Aquila's annual capacity is over 900,000 tons with products including high-octane gasoline, top-quality lubricating oils and several types of asphalts and paraffin waxes.

You can find your own profit-building answers by using Alco facilities and experience on your processing problems. Contact your nearest Alco Products sales representative today. Offices in Dunkirk, New York, Chicago, Los Angeles, Kansas City, Houston, Tulsa and Beaumont.

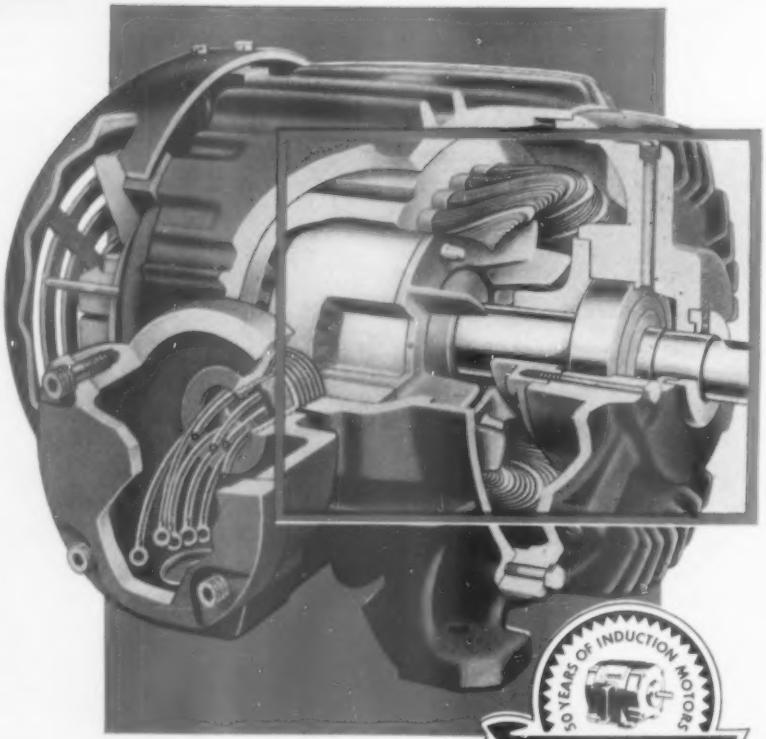
ALCO
PRODUCTS
AMERICAN LOCOMOTIVE COMPANY
Sales and Service Offices in Principal Cities

Here's motor superiority

you can see



It takes 6 bolts not just 4 to give full bearing protection



THE TWO EXTRA BOLTS in the end housing of every Allis-Chalmers ball bearing motor are the proof of *extra* protection against bearing failure. These are the bolts that hold the bearing cap tightly in place against the inner face of the bearing enclosure. This cap, with its close running clearances, keeps grease from the interior of the motor . . . retains an ample supply within the bearing enclosure . . . protects the grease and the bearing against contamination from dirt and moisture.

At the outer side of the bearing, double labyrinth seals keep grease in, also keep dirt out. What's more, large grease reservoirs act as additional dirt traps.

Result? Allis-Chalmers motors pay off in longer, trouble-free bearing life, lower motor maintenance.

Get all the facts . . . judge for yourself — Compare Allis-Chalmers motors with other motors. Get the six-bolt construction that gives you complete bearing protection. For proof, see your Allis-Chalmers Office or Authorized Distributor, or write — Allis-Chalmers, Milwaukee 1, Wisconsin.

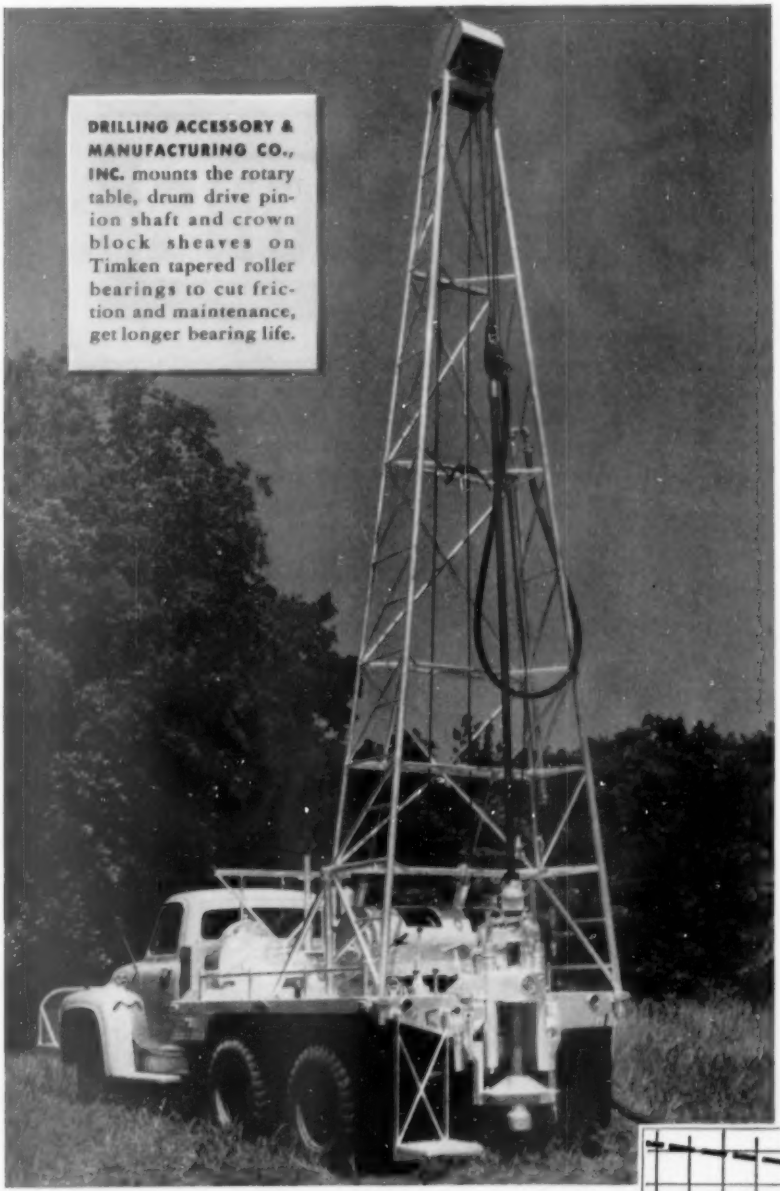
ALLIS-CHALMERS

A-C ALLIS CHALMERS

A-4447

Damco's new rigs do both regular and core drilling with easy adjustments

...TIMKEN® bearings cut maintenance costs



DRILLING ACCESSORY & MANUFACTURING CO., INC. mounts the rotary table, drum drive pinion shaft and crown block sheaves on Timken tapered roller bearings to cut friction and maintenance, get longer bearing life.

THE versatile new AR-1250 and AR-2000 portable drill rigs, manufactured by the Drilling Accessory & Manufacturing Co., can be used for drilling water wells, seismograph shot holes, blast holes or, with an easy adjustment, for core drilling. Ten Timken® tapered roller bearings on the rotary table, drum drive pinion shaft and crown block sheaves keep maintenance low and availability high.

Because of their tapered construction, Timken bearings take radial and thrust loads in any combination. The pinion shaft is held in rigid alignment. Gears mesh smoothly and accurately with minimum wear. There's less time out for maintenance.

Wear is held to a minimum because Timken bearings practically eliminate friction. They can because they're designed to roll true; and because they're made with microscopic accuracy to conform to their design. And you're doubly assured of Timken bearings' quality, because we make our own steel. No other U. S. bearing maker does.

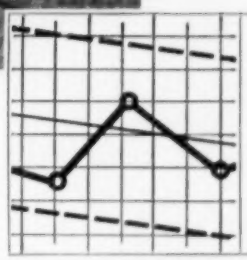
So, whether you build or buy drilling equipment, specify Timken bearings. Always look for the trademark "Timken" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



STATISTICAL QUALITY CONTROL

To insure uniform high quality and closer tolerances, the Timken Company uses statistical quality control. With it, tolerance deviations are plotted graphically. It's one of industry's newest, most scientific methods of improving product uniformity.

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◫ AND THRUST →◫← LOADS OR ANY COMBINATION

ALKYLATION PLANT

by

PARSONS

Now on stream and exceeding performance guarantees is the alkylation plant completed recently by Parsons for the Ohio Oil Company at Robinson, Illinois. This was a turnkey job from process design through construction and initial operation of the plant.

THE RALPH M. PARSONS
COMPANY
Engineers • Constructors
617 South Olive Street, Los Angeles 14, California
NEW YORK • TULSA • WASHINGTON
ANKARA • BAGHDAD • BEIRUT • KARACHI • PARIS

BEAIRD-INGERSOLL-RAND
Packaged Compressor Plant

Lowest Cost Per Horsepower Installed

Triples Production—

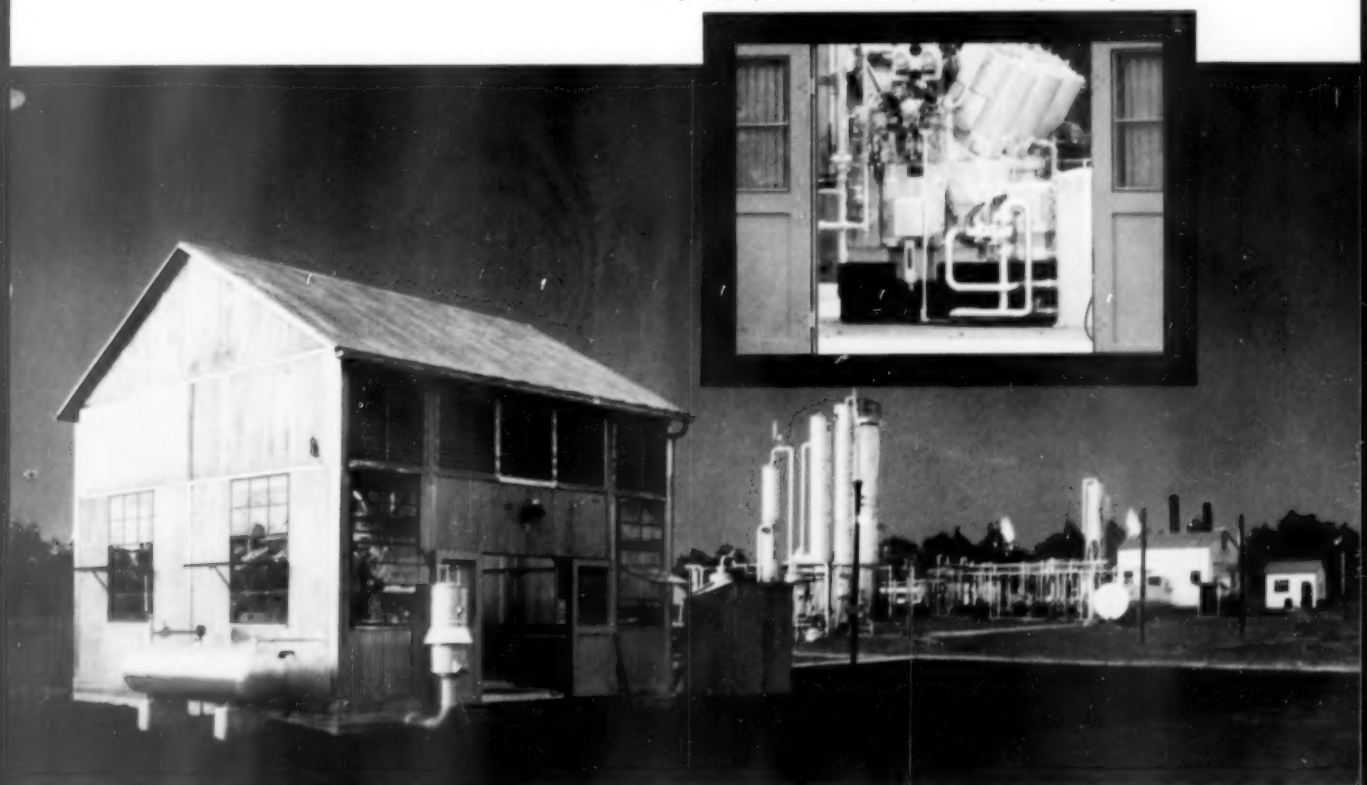
PACKAGED COMPRESSOR MAKES FLEXIBLE INSTALLATION

ARKANSAS LOUISIANA GAS COMPANY had seven wells in the Rodessa Field where wellhead pressures had dropped below the pressure of the gathering lines. Formerly good producers, the wells still contained profitable reserves that could be recovered by lowering gathering line pressure. To put the wells back into production economically, a 330 h.p. Beaird-Ingersoll-Rand Packaged Compressor Unit was installed at the Smithland, Texas, gasoline plant. Lowering pressure on the field line and boosting the gas through the plant and into the sales line, the unit tripled production from the wells.

Anticipating a relatively short life for the field, Arkansas Louisiana Gas specified that Beaird design the unit to meet a wide range of operating conditions. The flexibility of this design will permit the unit to be moved without change, to other service. Completely assembled and mounted on its own steel base it required a minimum in the way of permanent foundation and connecting piping. This feature makes the installation almost wholly salvageable when moved.

Pioneers and leaders in the development of packaged compressor plants — Beaird offers you proven equipment with an outstanding record of successful operation over a wide range of service.

Let us show you how a Beaird-Ingersoll-Rand packaged compressor plant can be designed to meet your requirements.



Arkansas-Louisiana-Gas Company's Smithland, Texas, packaged compressor plant — equipped with an Ingersoll-Rand 330 h.p. 8SVG gas engine driven compressor, Young radiator and all necessary equipment and controls. Other sizes 110 h.p. to 660 h.p. The steel deck has been mounted flush with the flooring at the option of the purchaser.

THE J. B. BEAIRD COMPANY, INC.
Shreveport, Louisiana

BEAIRD

MACHINING MANUFACTURING STEEL WAREHOUSE

PACKAGED COMPRESSOR PLANTS

CAST STEEL FITTINGS

PRESSURE BULK STORAGE

ANHYDROUS AMMONIA EQUIPMENT

LP GAS SYSTEMS

Be sure with Pure

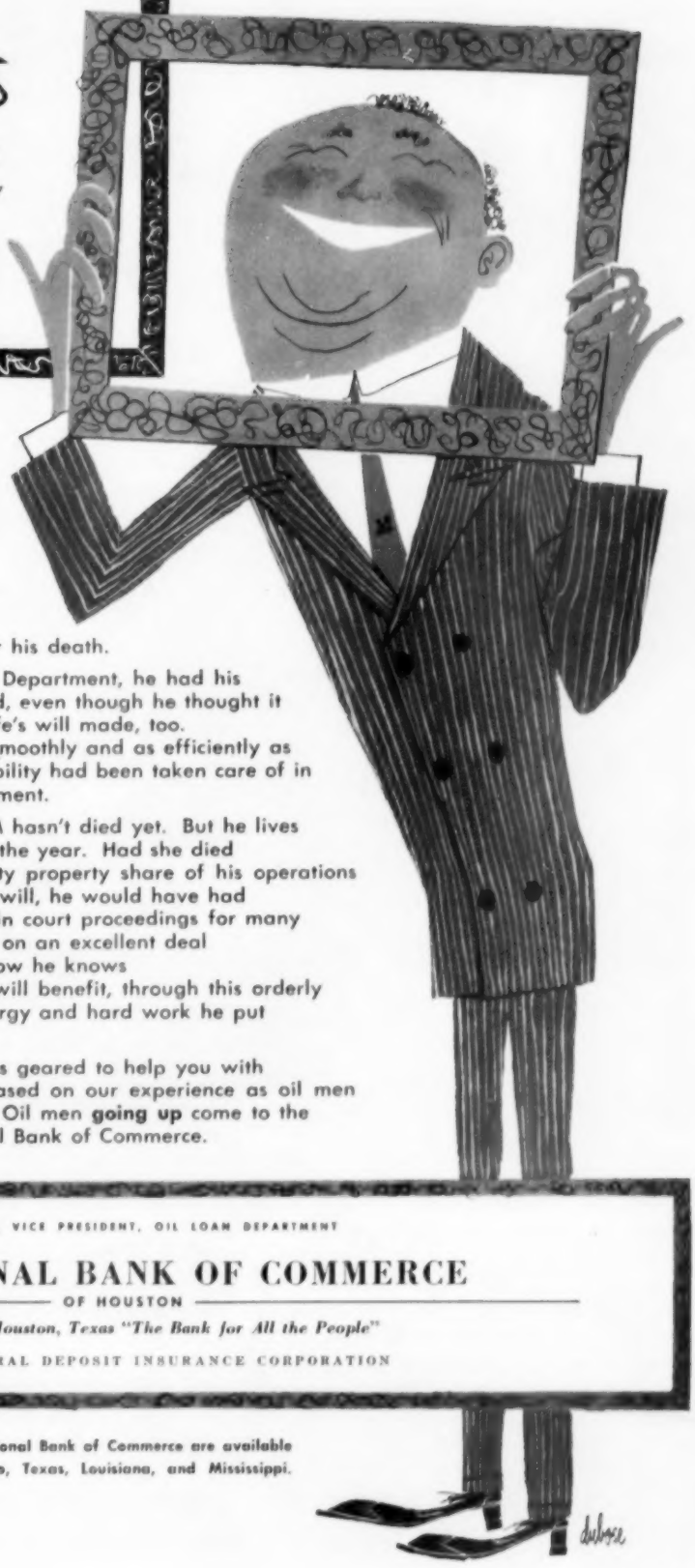
Producers • Refiners • Marketers

of petroleum products

THE PURE OIL COMPANY

Marketing Offices in Principal Cities of the Eastern, Central and Southern States
General Offices, Chicago, Illinois

Mr. "M" was the picture of health



Mr. M. was in the best of health, and when we first suggested that he take certain steps in case of death he thought it was a lot of needless trouble. We showed him how our Trust Department could arrange his affairs in an orderly way, and allow his operation to continue after his death.

Following the advice of our Trust Department, he had his lawyer draw up a will for him. And, even though he thought it was a waste of time, he had his wife's will made, too. His finances were set up to run as smoothly and as efficiently as his oil operation. Every future possibility had been taken care of in the plans made by the Trust Department.

Now this story has a twist. Mr. M hasn't died yet. But he lives in Texas, and his wife died early in the year. Had she died without a will, and if her community property share of his operations had not been taken care of by such will, he would have had a sizable part of his estate tied up in court proceedings for many months. He would have missed out on an excellent deal which he was able to make. And now he knows that when he does die his children will benefit, through this orderly financial arrangement, from the energy and hard work he put into building his holdings.

The National Bank of Commerce is geared to help you with your problems. Impartial advice, based on our experience as oil men and money men will help you, too. Oil men **going up** come to the Oil Loan Department of The National Bank of Commerce.

E. O. BUCK, VICE PRESIDENT, OIL LOAN DEPARTMENT

THE NATIONAL BANK OF COMMERCE

OF HOUSTON

Gulf Building, Houston, Texas "The Bank for All the People"

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

Facilities of the Oil Loan Department of The National Bank of Commerce are available in Wyoming, Colorado, Nebraska, New Mexico, Texas, Louisiana, and Mississippi.

How much are Standard's owners paid?

75 years ago one of the companies from which Standard Oil Company of California grew was formed by five men. In those days smaller communities and simpler needs could be served by concerns owned by one man or a small group. They furnished all the money—they kept all the profit, too. But the West grew tremendously, and we've grown up with the West.

Today, no one man could pay for all the oil fields, refineries, and other equipment Standard needs to serve you well. These investments are shared among Standard's 112,000 owners. About 97% of these shareholders are private individuals like you—including 12,000 Standard employees, our largest single group of owners. In addition, 293 schools and universities are owners of Standard, along with 224 churches and religious organizations, 165 hospitals and medical groups, and 1889 small and large businesses. These are our sole proprietors—we are neither owned nor controlled by any of the Standard companies in the East. Like the proprietors of any company, these shareholders receive the profits from their business. Each dollar they have in Standard is now earning approximately 10¢ a year. Only about 5¢ of this is paid to them in cash. The remainder is plowed back into the business to bring you even better products and services . . . to stay ahead of competition and keep pace with your needs.

STANDARD OIL COMPANY OF CALIFORNIA

75 years of planning ahead to serve you better

Our Cities and Industries are **THIRSTY FOR WATER**

.....so is Agriculture

As more and more people move into private homes, water consumption climbs sharply. Without exception new production techniques in industry result in increased need for water . . . on our farms and ranches, the rapid growth of irrigated acreage means that more water is needed so that our food production can keep pace with population growth. America is truly thirsty!

Layne—the world's largest developers of ground water resources—knows most about these thirsts and how to satisfy them.

The knowledge and experience gained the world over is at your service. Your nearest Layne Associate Company can answer any question that relates to water—or write direct to:

LAYNE & BOWLER, INC.
Memphis 8, Tennessee

Layne Associate Companies Throughout The World

Layne

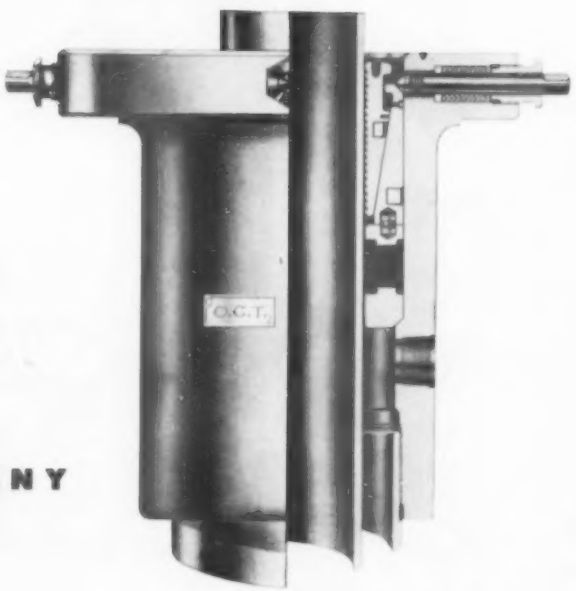
Water Wells • Vertical Turbine Pumps
Water Treatment

On Your Off-Shore Operations, *THE BEST IS NONE TOO GOOD!*

O-C-T C-19 CASING HEADS give you greater safety and dependability

than any other hanger you can buy

O-C-T "C-19" Casing Heads are a natural for off-shore work. They are designed for maximum safety on both land *and* off-shore wells, saving you added costs for special equipment to give you the protection you need. The "C-19", designed for quick setting and positive sealing, gives extra protection against blowouts because the well is closed in around the casing and the seal applied automatically before preventers are unflanged. Both crews and rig are protected. Enough hours of valuable rig time are saved to more than pay for the cost of the head itself. Ask your O-C-T representative or write for information.



O·C·T

OIL CENTER TOOL COMPANY

Export Representatives: Sterling Areas — Le Grand, Sutcliff & Gell, Ltd., Rochester, Kent, England. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston, Texas.

. . . you can count on the written specifications of PITT CHEM Modified Enamel!

Specifications are the tip-off on any enamel's performance . . . in good terrain or bad, in application or in service. That's why it's so important to check "specs" before you buy and to make sure that the enamel is held to close tolerances within the specifications that have been laid down.

Pitt Chem Modified Pipeline Enamel is Quality-Controlled from coal to finished product. It rigidly conforms to written specifications. These specifications have been published for your convenience and we'll welcome the opportunity to send them to you. Write or call us . . . *today!*

W&D 3048

Send For Free Booklet

Tells the importance of each specification in judging pipeline enamels . . . specific gravity, softening point, penetration, ash, etc., and gives the complete specifications of Pitt Chem Modified Enamel. Write for your free copy!

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ENGINEERING REPORTS:

A SOURCE FOR PROCESS STEAM DEMAND, these G-E 6000-kw automatic extraction non-condensing turbine-generators at Sinclair's East Chicago refinery economically provide electric power as a by-product, help maintain plant steam balance.

General Electric power system helps

POWER CONTINUITY for uninterrupted production is provided by this G-E 4000-kva double-ended master unit substation. Normally-open tie circuit breaker provides an alternate power source if either transformer is de-energized.

PROTECTION AGAINST OVERLOADS is an advantage of these G-E oil fuse cutouts, which also can be used for switching at the Sinclair plant.

Incoming steam, at 900 lb pressure, and 900 F temperature is automatically extracted at 565 lb pressure for plant process use. Turbine's efficiency, reliability and long life also keep operating costs low.

Sinclair reach peak 110,000 bbl/day output

Modern East Chicago refinery utilizes co-ordinated G-E power system for top efficiency

One of the larger units in the industry, Sinclair's East Chicago refinery produces a complete range of petroleum products—at 110,000 barrels per day. Here is modern catalytic equipment—a polymerization plant to produce gasoline from light hydrocarbons—an alkylation plant to produce aviation gasoline.

General Electric equipment, working together as an integrated system, helps keep the East Chicago refinery operating at top efficiency—another example of G-E electrical systems providing continuity of production in petroleum refineries.

G-E application engineers, specializing in refinery systems, helped co-ordinate the plant's power-system equipment to fit its specific processing needs. G-E field engineers assisted with installation of equipment. Whether you build, expand, or modernize, these and other G-E Engineering services can help you to make the most of your electric equipment investment.

Cut your power distribution costs with the help of the full-color sound slidefilm, "The Vital Link," a G-E More Power to America program. Ask your G-E Apparatus Sales representative to arrange a showing. General Electric Co., Schenectady 5, N. Y.

661-48

Engineered Electrical Systems for Petroleum Refineries

GENERAL ELECTRIC

How far *was* Thirty Paces?

NOBODY knows, exactly. Back in the days of meetings on the "field of honor" neither the distances nor the weapons were very accurate. Land and buildings were sometimes "paced off" and even some phases of engineering followed the rule of thumb.

In the 49 years since Arthur G. McKee & Company was founded, *accuracy* has been the outstanding characteristic of our activities. Not just accuracy in measuring feet and inches but accuracy in determining the correct design for your plant—accuracy in its engineering and construction, accuracy in the selection and installation of equipment and controls.

The McKee organization makes a scientific approach to the problem of designing and constructing your new plant to earn a profit for you.

McKee Engineering Services

Arthur G. McKee & Company • Engineers and Contractors

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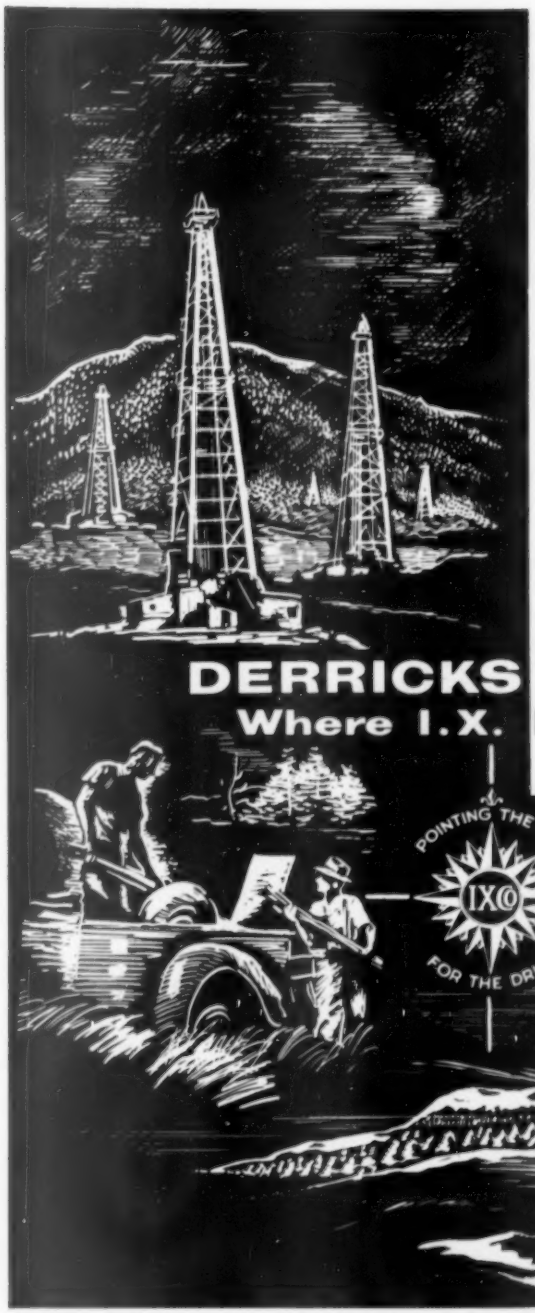

R. T. "Bob" Penny, Supervisor in the Mid-Continent and the Rocky Mountain Areas, is typical of IX executives. Having been with the company since 1939, Bob at one time or another has held practically every field job on an IX seismograph crew.

All Independent Exploration personnel—from the administrative level to working parties—are intimate with the requirements of a successful geophysical survey. This knowledge of field operations was gained in more than 22 years of intensive field work by men who, though now in executive positions, know the importance of a detailed, accurate survey. These men realize the value of prior planning for a survey and when to use time and cost saving "short cuts." This wealth of IX experience will guarantee you a better return from your survey investment.

Independent

EXPLORATION COMPANY

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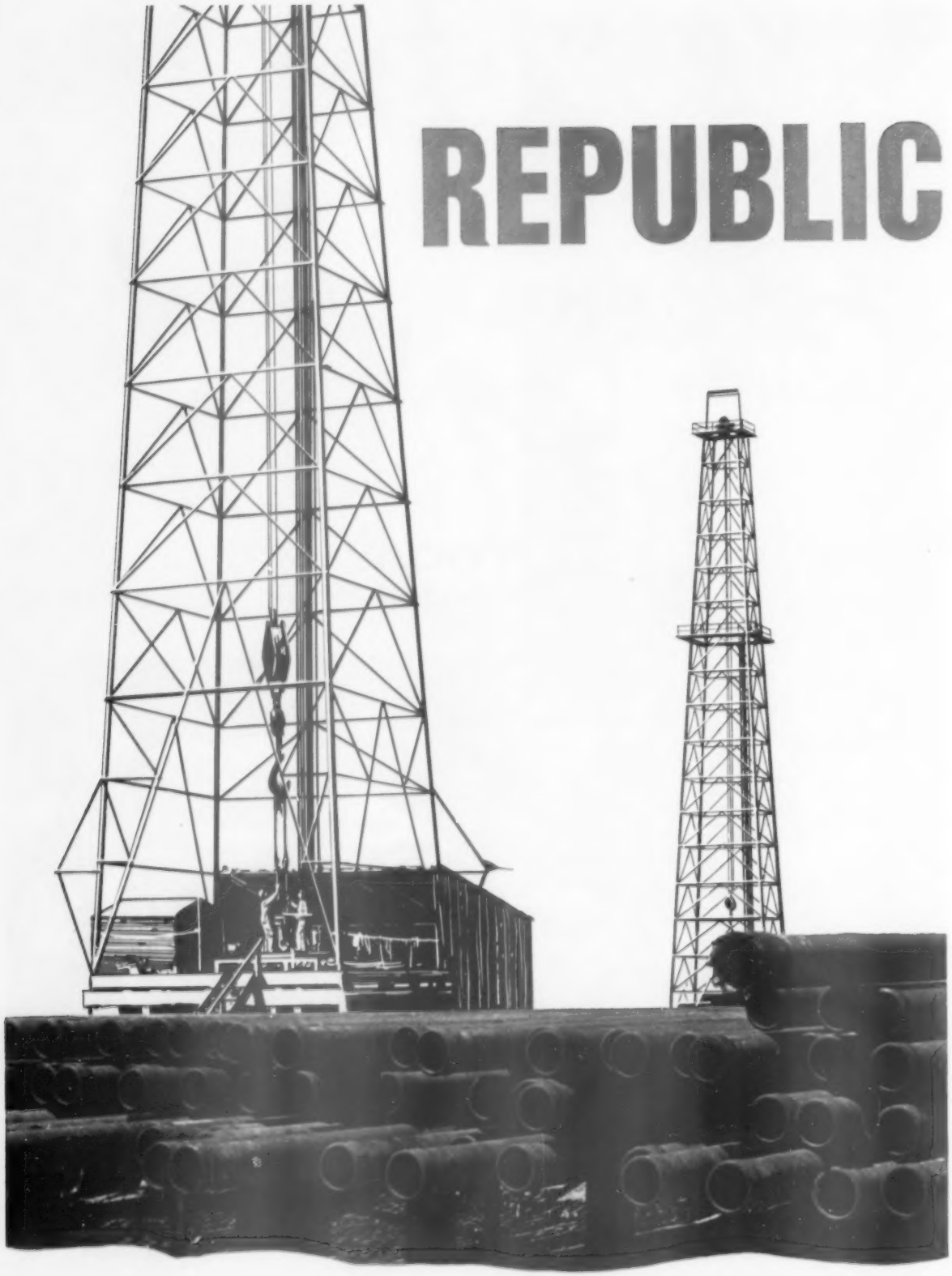
REPUBLIC

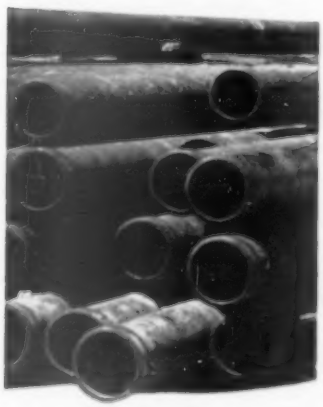


GET TO KNOW YOUR REPUBLIC PIPE DISTRIBUTOR. HE CAN HELP YOU!

SUPPLIES BOTH!

ELECTRIC WELD or SEAMLESS CASING and TUBING

FREE—for an interesting trip through Republic's new seamless mill, send today for this attractive picture booklet. Ask for No. ADV.-595.



For your casing and tubing requirements, Republic can now furnish either *Electric Weld* or *Seamless.*

Available in J-55 and N-80 grades, Republic Seamless Casing and Tubing are second to none in the industry for quality and dependability. That's because Republic employs the very latest manufacturing techniques—maintains rigid standards of quality-control from ore to finished product. And we ship by barge or rail from our new and conveniently located Chicago plant.

When you need H-40 or J-55, specify Republic's Normalized Electric Weld Casing and Tubing—widely used in the oil and gas industry for 25 years. Drillers like the important advantages such as the full-formed threads and uniform roundness that make for fast stabbing, spinning and tonging—strong, tight joints that resist pull-out—plus strong resistance to collapse due to high ductility and yield strength.

When you place your next order for casing and tubing, take advantage of Republic's integrated facilities—and *buy from one source.* Seamless sizes range from 2⅜" through 9⅝" O.D. Electric Weld comes in sizes 2⅜" through 13⅜" O.D. For complete information call your nearest Republic sales office. Or write to:

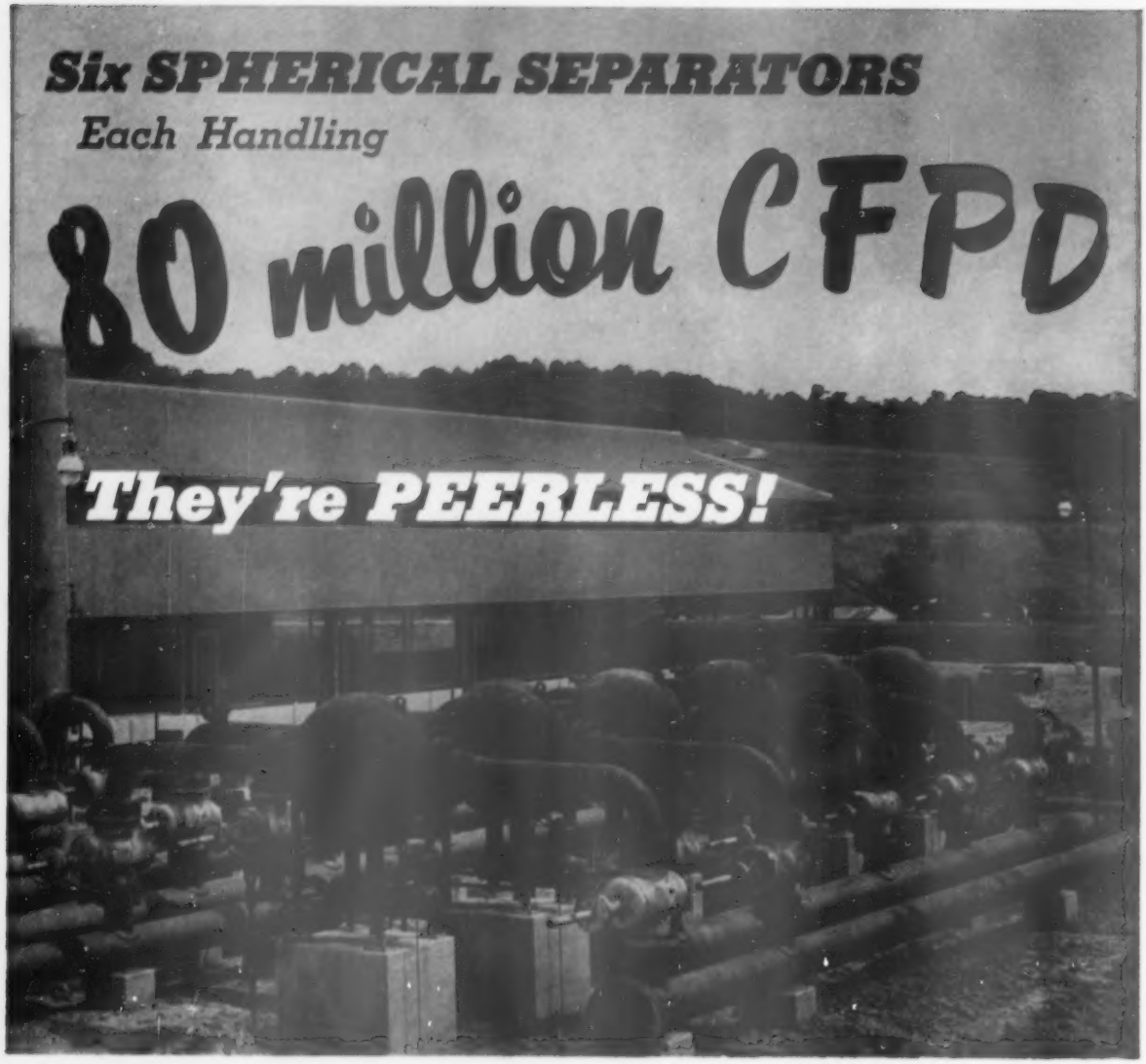
REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

REPUBLIC
CASING AND TUBING
Electric Weld and Seamless

Six SPHERICAL SEPARATORS

Each Handling

80 million CFPD



PEERLESS - *SPECIALISTS* in the *SEPARATION* of LIQUIDS and GASSES!

At a huge underground gas storage project in Pennsylvania, you'll find the SIX specially built PEERLESS SPHERICAL SEPARATORS, as pictured above. All compressed gas passes through these separators to prevent condensate from getting to the dehydration plant load and upsetting the schedule. These SIX PEERLESS SEPARATORS are good for 1,500 PSIG working pressure and are designed to pass 80 million CFPD each at 450 PSIG.

This is just another installation typical of the many applications of PEERLESS SEPARATION EQUIPMENT.

PEERLESS MFG. CO.

PEERLESS MANUFACTURING CO.

P. O. BOX 13165 ★ DALLAS, TEXAS ★ DIxon-8431

REPRESENTATIVES IN ALL PRINCIPAL CITIES

Holding SAFETY MEETINGS Regularly

What **POLICYHOLDERS** *Say*

This is one of many testimonial letters received from policyholders of the Texas Employers Insurance Association. These letters tell what policyholders think of the Service and Savings received from the Association.

Ask the Texas Employers representative nearest you to show you more of these letters, as proof of what Texas' largest writer of Workmen's Compensation Insurance can do for you.

40TH ANNIVERSARY 1914-1954

WE QUOTE FROM A POLICYHOLDER'S LETTER

"We have today received your dividend check for $20,813.23. This check plus our guaranteed cost discount which we have already deducted represents a total savings of 65.69% of our workmen's compensation insurance premiums for the past year.

"Our losses for the year amounted to only 4.31% of our premiums. This is by far the best year we have ever had from the standpoint of the number and cost of accidents sustained. You will recall that we installed a comprehensive safety program at the time you wrote this policy and our employees have diligently maintained this program in effect. Our drilling rigs and our plant are regularly holding safety meetings and we attribute much of our success to these meetings. We feel that the savings in payroll cost and increased efficiency more than offset the time spent on the safety program.

"We heartily recommend a safety program to any contractor in the oil industry."

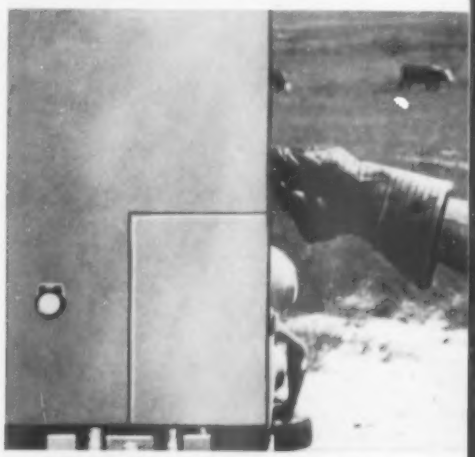
Largest Writer of WORKMEN'S COMPENSATION INSURANCE *in Texas*

HOMER R. MITCHELL, *Chairman of the Board* A. F. ALLEN, *President*

Service Offices: ABILENE • AMARILLO • AUSTIN • BEAUMONT • CORPUS CHRISTI • DALLAS • EL PASO FORT WORTH • FREEPORT • GALVESTON • HARLINGEN • HOUSTON • LUBBOCK • MIDLAND ODESSA • PORT ARTHUR • SAN ANGELO • SAN ANTONIO • SHERMAN • TYLER • WACO • WICHITA FALLS

TEXAS EMPLOYERS INSURANCE ASSOCIATION
HOME OFFICE - DALLAS, TEXAS

PROGRAM TIMER DOOR permits quick and easy access for adjusting timer. Padlocking of timer door will lock complete starter.



ALL FREQUENT OPERATING FUNCTIONS, including resetting of relays, can be performed without entering starter part of enclosure.

NEW G-E OIL-WELL PUMPING STARTER

Features exclusive gasketed enclosure and ventilated overload relay compartment

The all new G-E oil-well pumping starter includes those features you, in the oil industry, asked for. Specifications for this new starter were written by oil field personnel and a sample starter was taken to oil industry engineers for checking.

EXCLUSIVE IN THE G-E OIL-WELL PUMPING STARTER is the gasketed enclosure and ventilated overload relay compartment. This separate compartment helps prevent bi-metallic overload relays from tripping prematurely due to heat from the sun. Compartment space is adequate for installing a third relay in the field if required.

BUILT FOR ALL WEATHER CONDITIONS, the new G-E oil-well pumping starter has a baked-on enamel finish over a phosphate-treated base. The enclosure of the new, lighter, more streamlined starter is gasketed with heat-resistant neoprene to prevent the entrance of dust and moisture.

OTHER OUTSTANDING FEATURES include Flamenol* wire insulation which resists flowing and insulation breakdown from heat; a new undervoltage relay for more positive action, a sequence restarting timer for staggering return of wells to service after power outage, and a snap-action HCI disconnect switch.

FOR MORE INFORMATION contact your nearest G-E Apparatus Sales Office, Agent or Distributor, or write to Section 730-56, General Electric, Schenectady, N. Y. Ask for bulletin GEA-6153.

*Reg. trademark of General Electric Co.

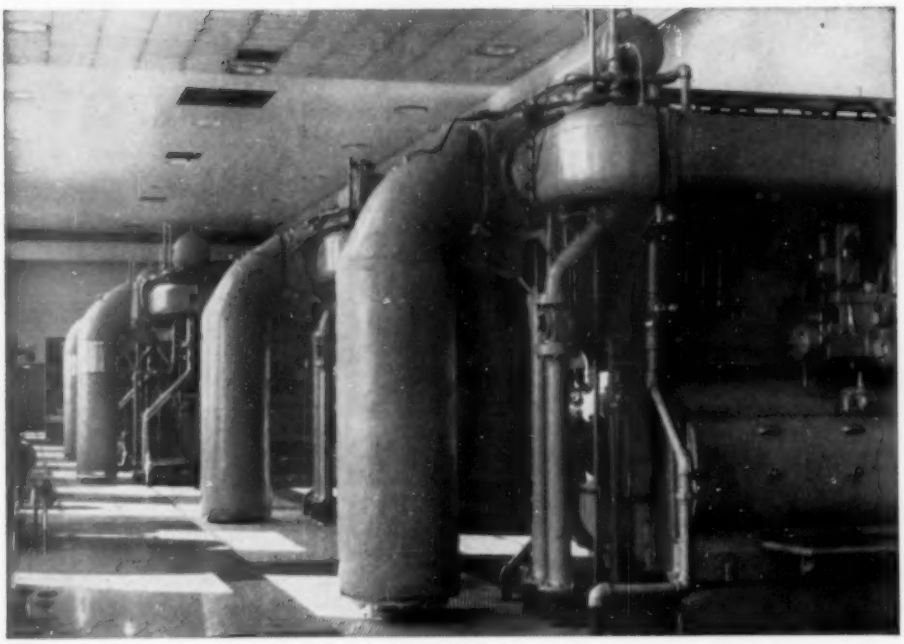
Progress Is Our Most Important Product

GENERAL ELECTRIC

Another Pipe Line Company Reports

2 to 3 times more horsepower hours

. . . after installing Koppers Conformable Oil Rings



Koppers Porous Chrome* Rings. Porous chrome surface holds and distributes oil during break-in. Seats quickly. This chrome prevents grit from embedding in ring surface. Prevents cylinder wall scratching. Reduces wear 50%. Last 4 times longer than other rings.

Koppers Conformable Ring maintains constant unit pressure for positive oil control. Conforms readily to meet cylinder distortion because flexible cast iron member is pressed outward by abutment type spring which exerts uniform radial pressure around entire circumference.

*Van der Horst Process

Here's proof that Koppers Piston Rings increase operating efficiency.

Prior to using Koppers Conformable Oil Rings, a pipe line company reported average oil consumption as approximately 3500 to 4000 horsepower hours per gallon. Now they are getting 2 to 3 times that much.

In addition to this large saving in oil consumption, they find they get longer periods of satisfactory operation between overhauls.

As a result, this pipe line company has adopted Koppers Piston Rings as standard equipment on all their 12½" x 13" turbo-charged engines.

Does this suggest possible savings in your operation? Less oil consumption? Less down time, lower labor costs? Then investigate Koppers Porous Chrome* and Conformable Oil Rings. And install them next time you have a piston ring replacement job.

Write for special assistance from our experienced technical staff. No obligation, of course . . . . and mail the coupon for special conformable ring folder.

KOPPERS®

AMERICAN HAMMERED
Industrial Piston Rings

METAL PRODUCTS DIVISION • KOPPERS COMPANY, INC. • Baltimore, Maryland
This Koppers Division also supplies industry with Fast's Couplings, Aeromaster Fans, Koppers Electrostatic Precipitators and Gas Apparatus.
Engineered Products Sold with Service

KOPPERS COMPANY, INC., *Piston Ring Dept.*, 1559 Hamburg Street, Baltimore 3, Md.
Gentlemen: Please send me full information on your Conformable Oil Ring.

Name .....
Company .....
Address .....
City ..... Zone ..... State .....

CATFORMING *means*

for high octanes and high yields at low cost

Simplicity is the keystone of Catforming. Why? Because simplicity takes the high cost out of high octanes and high yields.

Simplicity speeds construction of Atlantic Catforming units—saving you money and time.

Simplicity makes operation of these units easy—saving you money on operating costs and manpower as well.

Simplicity means efficiency — Catforming cuts out intermediate steps in processing feed stocks, gives you high octane gasoline ready for immediate blending—and distribution.

Simplicity goes all the way with Catforming, including the licensing agreement—you'll find it well worth looking into. Remember, the performance of Catforming units has been proved in highly successful commercial operations in many areas. Write, wire or phone for detailed information — ask for our brochure, "CATFORMING." The Atlantic Refining Company, Research and Development Dept., P. O. Box 8138, Philadelphia 1, Pa.

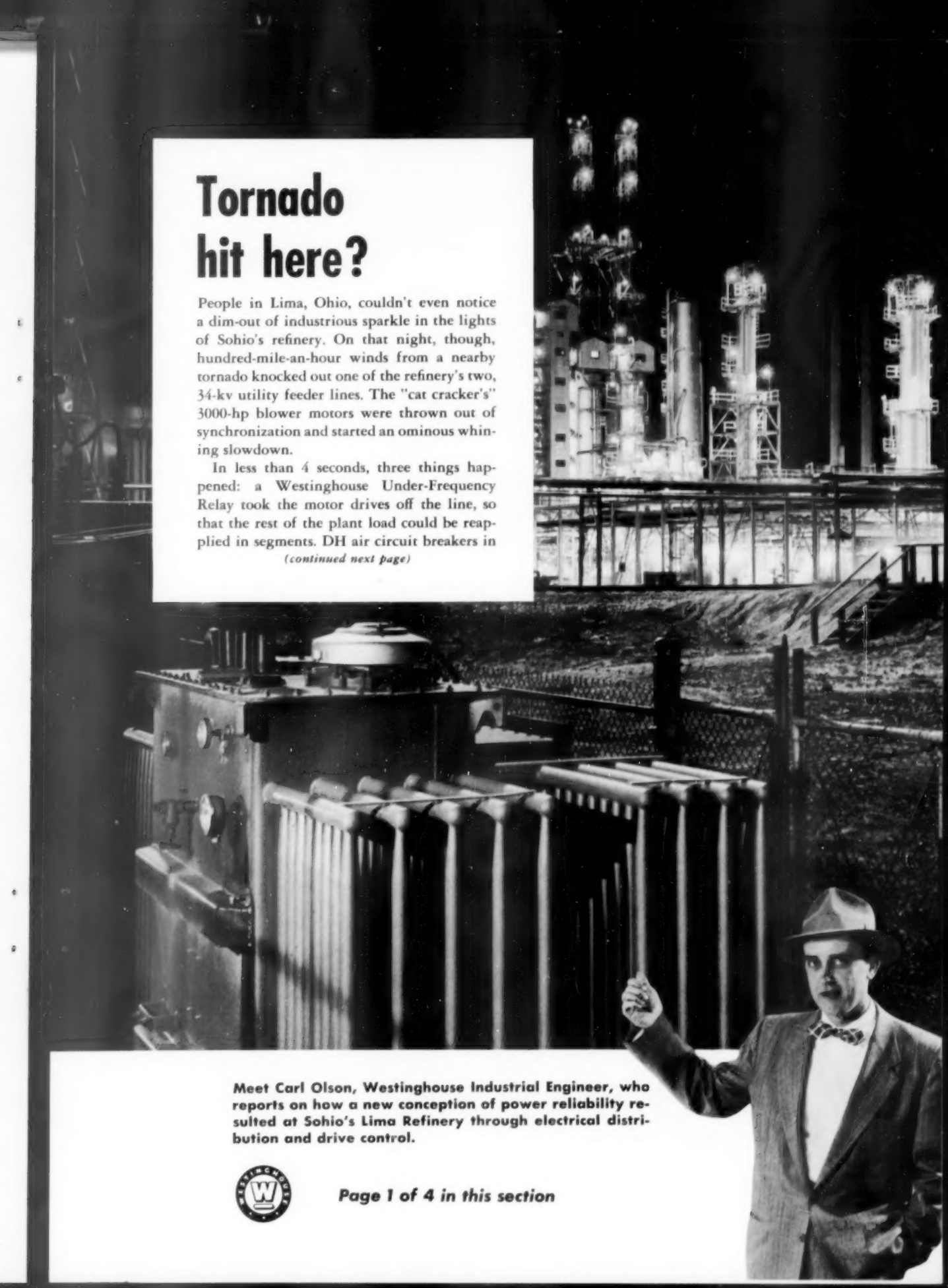
ATLANTIC *It's the Catalyst that counts*

Tornado hit here?

People in Lima, Ohio, couldn't even notice a dim-out of industrious sparkle in the lights of Sohio's refinery. On that night, though, hundred-mile-an-hour winds from a nearby tornado knocked out one of the refinery's two, 34-kv utility feeder lines. The "cat cracker's" 3000-hp blower motors were thrown out of synchronization and started an ominous whining slowdown.

In less than 4 seconds, three things happened: a Westinghouse Under-Frequency Relay took the motor drives off the line, so that the rest of the plant load could be reapplied in segments. DH air circuit breakers in

(continued next page)



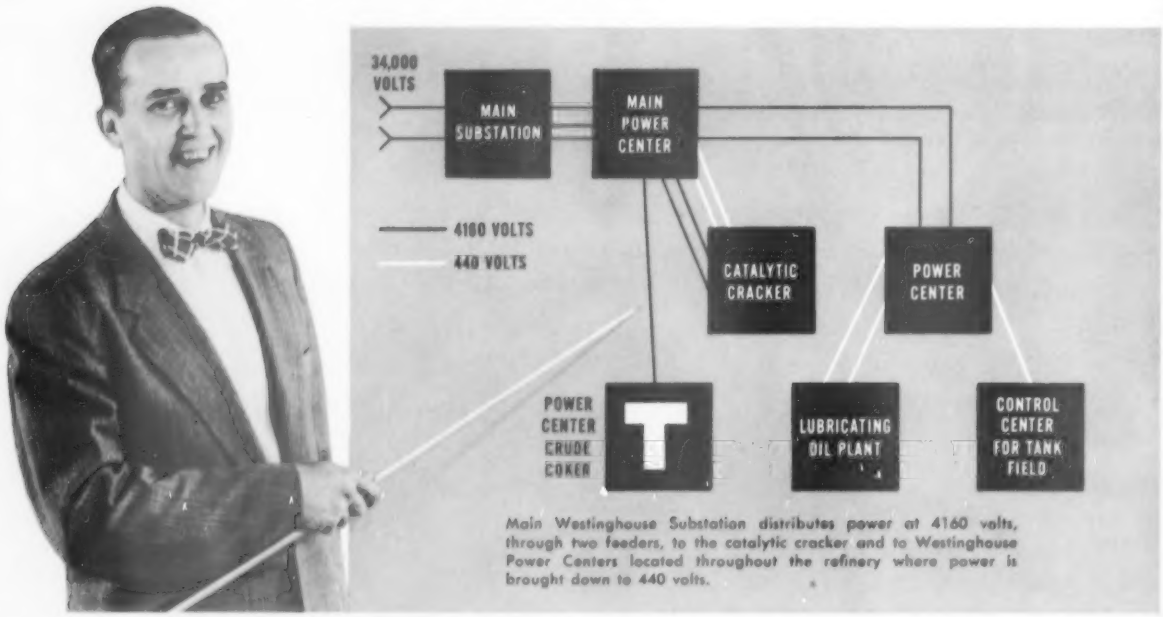
Meet Carl Olson, Westinghouse Industrial Engineer, who reports on how a new conception of power reliability resulted at Sohio's Lima Refinery through electrical distribution and drive control.

the main Westinghouse Switchgear automatically closed, bringing power in from the second utility feeder. Automatic control restarted the blower motors and a $30,000 outage was averted.

This absolute electric power reliability was the result of thorough planning by Sohio Engineers, the Dingle-Clark Co., and Westinghouse. They decided that quick restoration of power is the most efficient method of assuring continuous production from the refinery process. An ingenious control system was installed to automatically clear trouble in 4 to 5 seconds. The resulting electrical system brought important advantages in flexibility, economical operation and simplified maintenance.

At Sohio's Lima Refinery . . .

Speedy restoration of service is key to process protection



Main Westinghouse Substation distributes power at 4160 volts, through two feeders, to the catalytic cracker and to Westinghouse Power Centers located throughout the refinery where power is brought down to 440 volts.

Westinghouse 4160-volt Switchgear, left, is located in the main substation protecting refinery load of 16,200 kva. It provides under-frequency and automatic-starting control for the main blower motors.

Drawout feature of these high-voltage, Type DH, De-ion® circuit breakers allows them to be changed in only 3 minutes. Inspection and maintenance can be made simply and quickly with minimum disturbance to refinery operations.

. . . System growth at low cost results

The refinery's present duplex system is so planned that Sohio can add additional capacity easily in the future. Sohio engineers point out that they are now using 16,200 kva, and can go up to 25,000 kva without adding additional switchgear.

Standard, unitized construction of Westinghouse Substations and Power Centers will make it easier to expand or rearrange circuits when needed.

Westinghouse Power Centers add economy

Sohio engineers report that the compact and completely enclosed design of Westinghouse Power Centers permits installation near the centers of refinery load with resulting savings in power and cable, and at the same time conserves building space. Voltage loss at distant locations, such as tank-field pumping stations, is prevented. Motor drives operate efficiently at full rating.

Maintenance man-hours limited

On low-voltage circuits Westinghouse AB-I Circuit Breakers cut down maintenance time with 3-step protection. First, these breakers will not trip on light or short-duration overloads. Second, they will trip immediately in case of serious fault, but once the fault is cleared a flip of the breaker handle restores power. There is no time lost locating replacement fuses. Third, AB-I breakers always remain properly calibrated. There's no danger of under or over fusing.

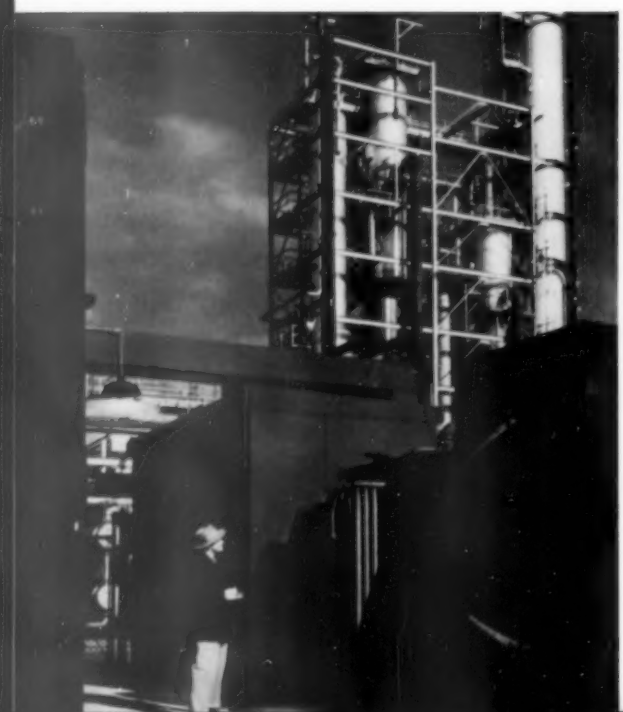
Westinghouse Field Engineering plays a part

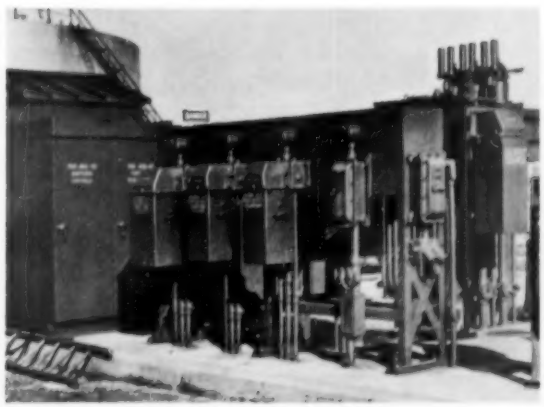
In the event of major electrical equipment damage, Sohio can always rely on Westinghouse Field Engineering Service. Available from 56 Field Service Offices, Westinghouse Engineers are on 24-hour call to take care of emergencies.

In addition, 38 Westinghouse Manufacturing and Repair Plants provide factory-type service. And 31 Westinghouse Renewal Parts Warehouses help to simplify many refinery inventory problems on electrical equipment.

Next page, steam or electric drives . . . how the decision was made.

YOU CAN BE **SURE**...IF IT'S Westinghouse





Oil-immersed, combination Life-Line Starter and AB-I circuit breakers are grouped together providing control and circuit protection for pump motors. Units are easily inspected by lowering oil tanks.

Westinghouse 440-volt, Outdoor Power Center for the Lubricating Oil Plant contains two 1000-kva transformers, 4160/440 volts, and 440-volt air breaker switchgear.

for continuous operation of Sohio's Lima Refinery . . .

Electric drives show lowest cost

Thorough study showed electrical drives to be the most economical way to expand Lima Refinery capacity to 50,000 bbls. per day. Westinghouse experience in supplying both steam and electric drives helped to point out lower electrical installation and operating costs.

Refinery operating efficiency is improved with the help of Westinghouse Motors and Control for the "cat cracker" blowers and synchronous motors on the Lubricating Oil Plant refrigeration compressors. These synchronous drives improve the system power factor and deliver more power per dollar.

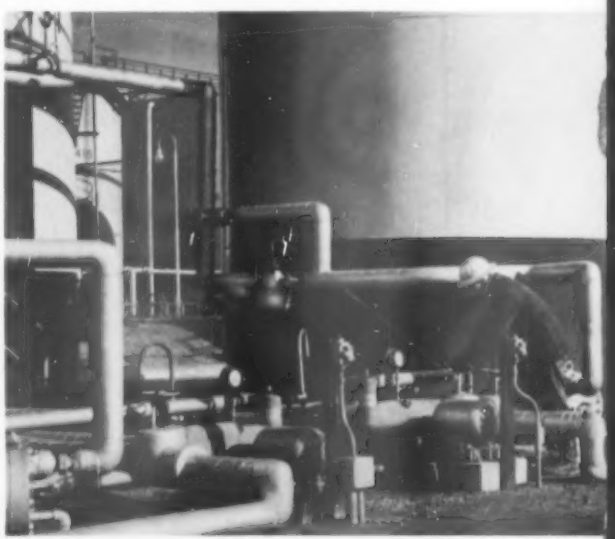
Life-Line® motor drives in the Lubricating Oil Plant and tank field require minimum attention. Sealed, pre-lubricated bearings and tough conductor insulation protect them from dust, moisture and corrosive action.

In analyzing refinery drive requirements, Westinghouse Engineers can help you with complete impartiality, too. Whether steam or electrical equipment proves more desirable, Westinghouse engineering provides dependable facilities for continuous refinery operation.

What to do NOW! Call your local Westinghouse Representative with questions on any of the equipment discussed. He'll supply you with copies of the literature listed below. Or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa.

- ☐ Power Centers B-4162
- ☐ High-Voltage, Metal-Clad Switchgear B-5306
- ☐ Low-Voltage, Metal-Enclosed Switchgear B-5282
- ☐ Dry-Type Transformers B-5920
- ☐ AB-I Circuit Breakers B-5456
- ☐ Preventive Maintenance Booklet B-5477
- ☐ Synchronous Motors and Control B-5300
- ☐ Motors and Control for Petroleum Industry B-5444
- ☐ Life-Line "A" Motors B-6154-A
- ☐ Life-Line Motors (200-700 hp) B-4731
- ☐ Large Induction Motors B-4739
- ☐ Complete Industrial Control and Services B-6051

Two Westinghouse 250-hp, 4160-volt synchronous motors with special enclosures operate safely in hazardous atmosphere. Westinghouse Engineers designed special hoods for purging the motors continuously with fresh air.



Pumping operations in the tank field are powered by Life-Line motors. Sealed, pre-lubricated Life-Line bearings eliminate the time and cost of greasing maintenance, prevent entry of dirt and moisture into the bearing. MP-3031

YOU CAN BE **SURE**... IF IT'S

Westinghouse

PUMP STRIPPER WELLS MORE PROFITABLY—

WITH

Carter

LONG-STROKE HYDRAULIC PUMPING UNITS-

• Designed • Built • Priced FOR STRIPPER WELLS

featuring the LONG, SLOW UPSTROKE and VARIABLE CYCLE which provide increased production — reduced Sanding Up — greater overall efficiency — longer life and low maintenance costs!

Actual records show that in many cases installation of Carter Units has caused substantial production increases. Long, slow upstroke and fast downstroke of Carter Units permit pumping at *nearly constant flow and with greatly improved overall efficiency.*

Some of the specific advantages Carter Pumping offers you are:

- Accurate control of pumping rate.
- Maximum production without pumping off or pounding fluid.
- Longer life for sucker rods and subsurface equipment.
- Reduction of costly downtime.
- Better handling of gassy, sandy or viscous fluids.
- Low first cost. Prices competitive with conventional mechanical equipment.
- Easily maintained by regular field personnel because of extreme simplicity of design and construction.
- No concrete foundation usually necessary
- Qualified representatives for sales and service are located at convenient points throughout the oil country.

With over 800 units now in service, some for as long as eight years, *the Carter method is increasingly recognized* by both majors and independents *as the better way to produce stripper wells.*

Available in Seven Models to suit your specific requirements.

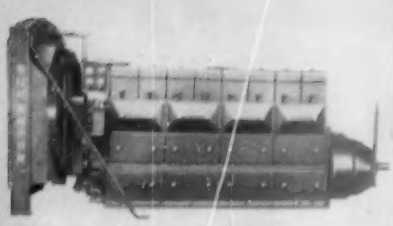
WRITE for bulletin **PR-253**

S. C. CARTER COMPANY, Inc.

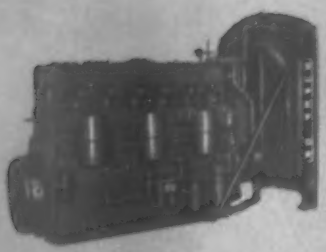
1900 Santa Fe Avenue
Los Angeles, California

Sales and Service Representatives in: CALIFORNIA — Los Angeles, ILLINOIS — Robinson, Salem, INDIANA — Princeton, Evansville, KANSAS — Chase, El Dorado, Great Bend, KENTUCKY — Irvine, Oil Springs, Owensboro, LOUISIANA — Harvey, Houma, Lake Charles, New Iberia, Shreveport, MICHIGAN — Mt. Pleasant, MONTANA — Conrad, Cut Bank, OHIO — Wooster, Zanesville, OKLAHOMA — Healdton, TEXAS — Alice, Barbers Hill, Bay City, Beaumont, Borger, Columbus, Corpus Christi, Houston, Kilgore, Liberty, Monahans, Pampa, Victoria, WEST VIRGINIA — Vienna, WYOMING — Casper.

Export: Edmonton — Caracas — Maracaibo — Puerto La Cruz — Port of Spain.

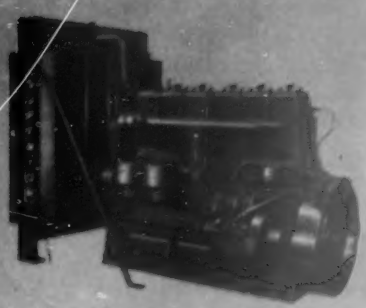


PTD-8
435 B.H.P.* 8 CYLINDERS
900 R.P.M.
DIESEL OR DUAL FUEL



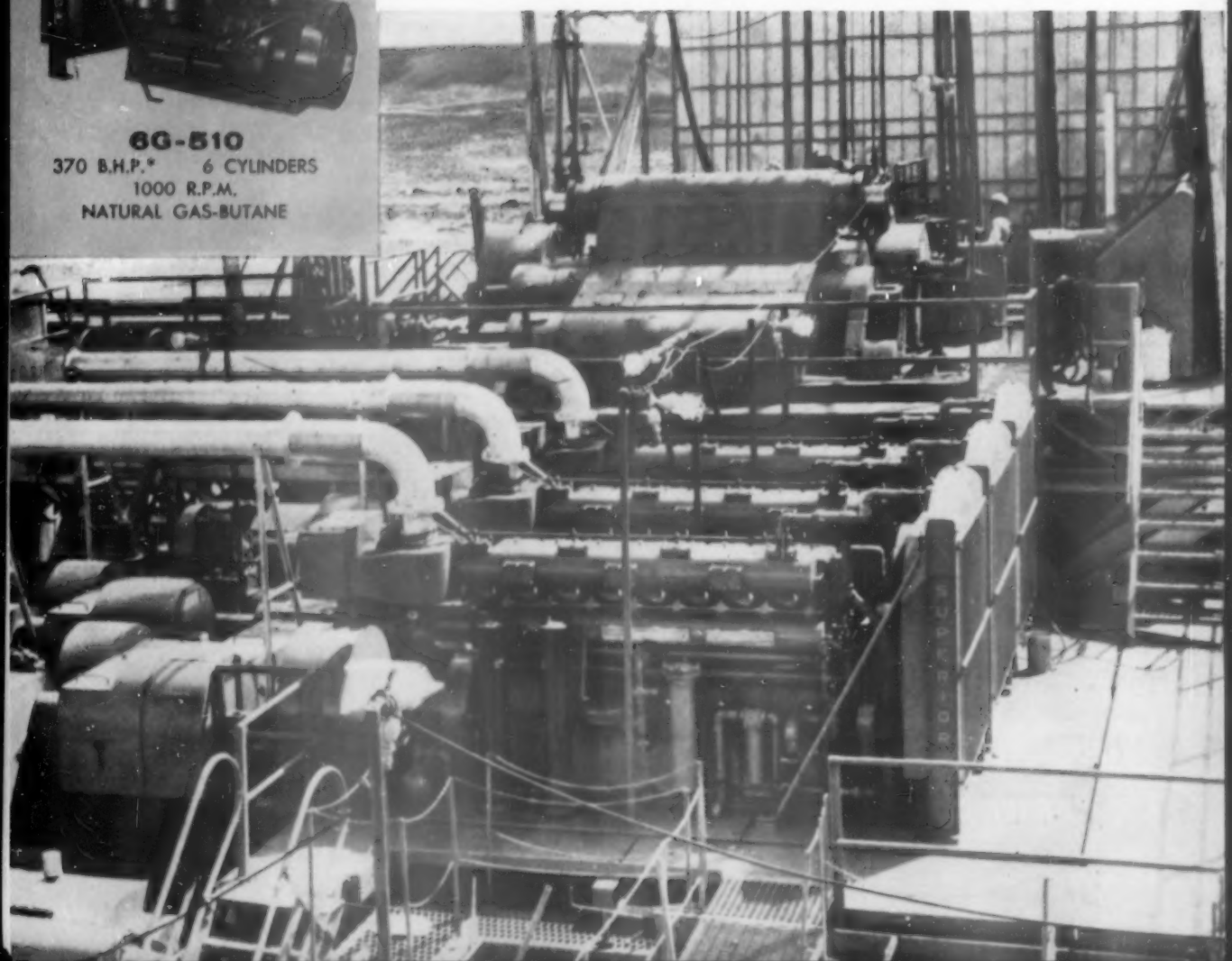
PTD-6
325 B.H.P.* 6 CYLINDERS
900 R.P.M.
DIESEL OR DUAL FUEL

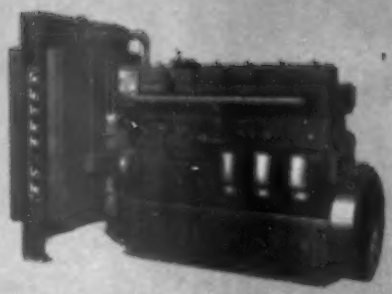
8G-825
675 B.H.P.* 8 CYLINDERS
900 R.P.M.
NATURAL GAS-BUTANE



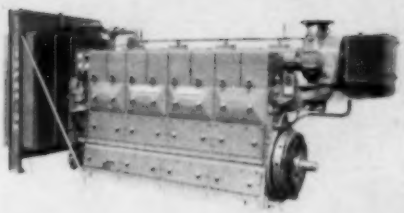
8G-510
370 B.H.P.* 6 CYLINDERS
1000 R.P.M.
NATURAL GAS-BUTANE

You get proven

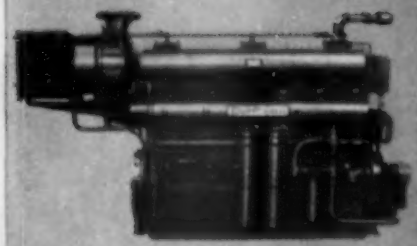




6G-825
510 B.H.P.* 6 CYLINDERS
900 R.P.M.
NATURAL GAS-BUTANE



PTDS-8
670 B.H.P.* 8 CYLINDERS
900 R.P.M.
DIESEL OR DUAL FUEL



PTDS-6
500 B.H.P.* 6 CYLINDERS
900 R.P.M.
DIESEL OR DUAL FUEL

*INTERMITTENT

economy and peak performance

with these gas, diesel and dual-fuel engines!

Regardless of the type of fuel used, Superior Engines consistently turn in outstanding power performance at drilling sites throughout the world's oil fields. And there are good reasons why these engines have built such a solid oil field reputation. *Engineered for maximum simplicity* in operation, complete accessibility to parts and minimum maintenance, these dependable Superiors provide the drilling contractor with power at the *lowest cost possible* consistent with efficient operating conditions.

Operating singly or in multiple groupings with "Ideal" Sectional Drive Groups, Superior Engines meet every field requirement for power application in drilling operations.

Why not make it a point soon to ask your local National Supply representative for the latest performance charts on Superior Drilling Engines. Ask, too, for bulletins that describe the many new design features that have been incorporated into Superior Drilling Engines.

NATIONAL BLUE PRODUCTS

First in quality . . . First in supply service . . . in oil country everywhere

THE NATIONAL SUPPLY COMPANY

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Export: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; River Plate House, 12 South Place, London E.C. 2

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT • SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

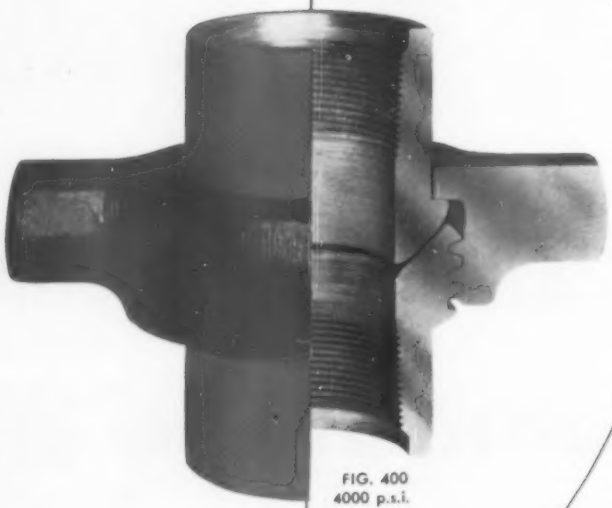

FIG. 400
4000 p.s.i.

WHERE THERE'S A WELL... THERE'S WECO

WECO Unions have a way of saving time and trouble—of giving long, care-free service that operators like. That's why you'll find WECO Unions wherever rigs are running, wherever wells are producing, wherever Supply Stores are serving the oil industry.

The ball and cone seat always makes a leak-proof seal—the wing nut with Acme threads draws up tight with a few hammer blows—precision machined pipe threads mean easier make-up and leak-proof connections. WECO Unions are made stronger, tougher to last longer in all kinds of service.

Standardize with WECO Unions—there's a size and pressure available for every oil field service.

PESA
PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION
PARTNERS IN PETROLEUM PROGRESS

it's wise to standardize with.. **WECO**

WECO®

WELL EQUIPMENT MFG. CORP. • Division of Chiksan Company • HOUSTON 1, TEXAS

New *Polyken* program puts a protective tape coatings expert "on your staff"

Polyken sets up a system of enfranchised specialists to help solve your corrosion problems

Now you can call upon a group of specialists—qualified to advise you and help you select and properly apply *Polyken* Protective Tape Coatings.

These experienced organizations are available for information; for tests; for in-plant applications and service in the field. They understand corrosion problems—and they know how to solve them with *Polyken* Protective Tape Coatings.

These organizations and their associated dealers are available to help you—to work with your engineers—or *as* your engineer!

Tear this out for reference—it lists

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DOWELL · SCHLUMBERGER
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Four companies agree on one transmitter location . . . one antenna tower . . . AND G-E!

2-WAY MOBILE RADIO

FREQUENCY STABILITY & SELECTIVITY
guaranteed for life!

At Houma, Louisiana, you'll find one of the most unique mobile radio installations in existence. Four major companies combined their communication interests to effect great economy of operation yet yield high efficiency for all users. *Under one roof,* four separate G-E 250-watt transmitters are housed. Following through with this community plan . . . *one tower* is common support to each of four antennas. In operation more than a year to date . . . no interference problem has yet been reported!

The system described here typifies what you can expect from G-E. Why not call on this expert radio engineering know-how for your communication requirements? *General Electric Company, Section X894-13, Electronics Park, Syracuse, New York.*

Progress Is Our Most Important Product

GENERAL ELECTRIC

MODERN FARMERS like J. A. Parks of Maloy, Iowa, using the gang plow above, can produce much more in much less time than the farmer of just a few years ago. In the horse-powered days of farming it took as many as 35 man-hours to produce and harvest an acre of corn. Now, on many mechanized farms, it is done in fewer than 11 man-hours. In addition, the shift from animal power to machine power released about 72,000,000 acres of cropland from producing feed for horses and mules to producing food for the nation's tables.

WHAT EVER HAPPENED TO THE MAN BEHIND THE PLOW?

THE "man behind the plow" is still very much in the picture, but he's *up front now.* And because he is, you and your family—even the world—are better fed today.

Not many years ago the American farmer walked behind the old horse-drawn plow, worked longer hours and produced much less than he does today. But that was before the development of the "hired hands" that never tire—the tractors, trucks and implements which do the work of many men, and the petroleum fuels and lubricants which keep them running.

In the last 50 years or so, while America's population was growing from 75,000,000 to more than 150,000,000 a remarkable change was taking place in agriculture. Today 8,000,000 *fewer* persons on America's farms are producing food for 75,000,000 *more* Americans.

Yet America has never been better fed. It has never been better equipped to export needed foods to other countries for normal requirements, or to combat famine—an ally of communism—wherever it appears.

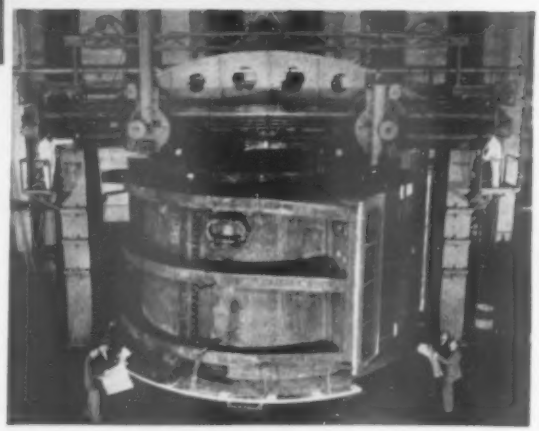
Never have so few fed so many so well.

To help make ours a more abundant land, Standard Oil pioneered in delivering petroleum products right to the farmers' doors in the quantities needed and at reasonable prices. This on-the-spot delivery, started way back in 1910, was vital to the rapid growth of mechanized farming in the Middlewest—one of the most productive agricultural regions in the world.

So many rural customers have learned to depend on Standard Oil products and services that we now serve far more Midwestern farmers than any other oil company.

Standard Oil Company (INDIANA)

Rotor discs for mammoth 11-stage compressor were balanced and stacked for alignment in one of Newport News' five huge machine shops. Large engineering and technical staffs with a vast plant make Newport News an ideal source for large equipment . . . *standard or special in design.*



A 35-foot boring mill in Newport News' plant machining the 374,000-pound upstream housing for the giant axial flow compressor. The compressor is heart of an 8-foot supersonic wind tunnel at the Ames Aeronautical Laboratory of the National Advisory Committee for Aeronautics at Moffett Field, Calif.

To create winds exceeding

2000 MPH

Newport News builds world's Mightiest Compressor

Whenever you want large units built with careful attention to detail, give the job to Newport News.

This company recently built an eleven-stage axial flow compressor that shatters all previous records for wind force . . . using what is believed to be the world's largest rotating object.

The rotor, weighing more than 400 tons, comprises eleven huge discs. Each disc, machined from a 96,000-pound forging, was finished to a 50,000-pound wheel and balanced to within 26 ounces at the rim. In each rim, slots for blades were machined to within .005" on special milling heads designed and produced in the Newport News plant.

Here at Newport News, you'll find more than large productive capacity. In machine shops, foundries and forging plants Newport News craftsmen complete your orders with specialized techniques backed by experience in fabricating thousands of products.

Newport News' craftsmen produce units that range from small components of spinning machines, to mammoth hydraulic turbines . . . from piping, pumps and valves, to vacuum tanks, digesters and bridge caissons.

These skilled men handle the job exactly as you want it done, for maximum results per dollar invested. So let us bid on your present or future projects. Learn how Newport News can help you. Send for our illustrated booklet entitled, "Facilities and products" . . . it's yours for the asking.

Newport News

Shipbuilding and Dry Dock Company

Newport News, Virginia

. . . here's my NEW warehouse at Worland, Wyoming!

M. A. PARK
District Sales Manager

BILL J. GOUGH
Local Store Manager

BURNEY P. FELTON
Storeman

WARREN CRABTREE
Storeman

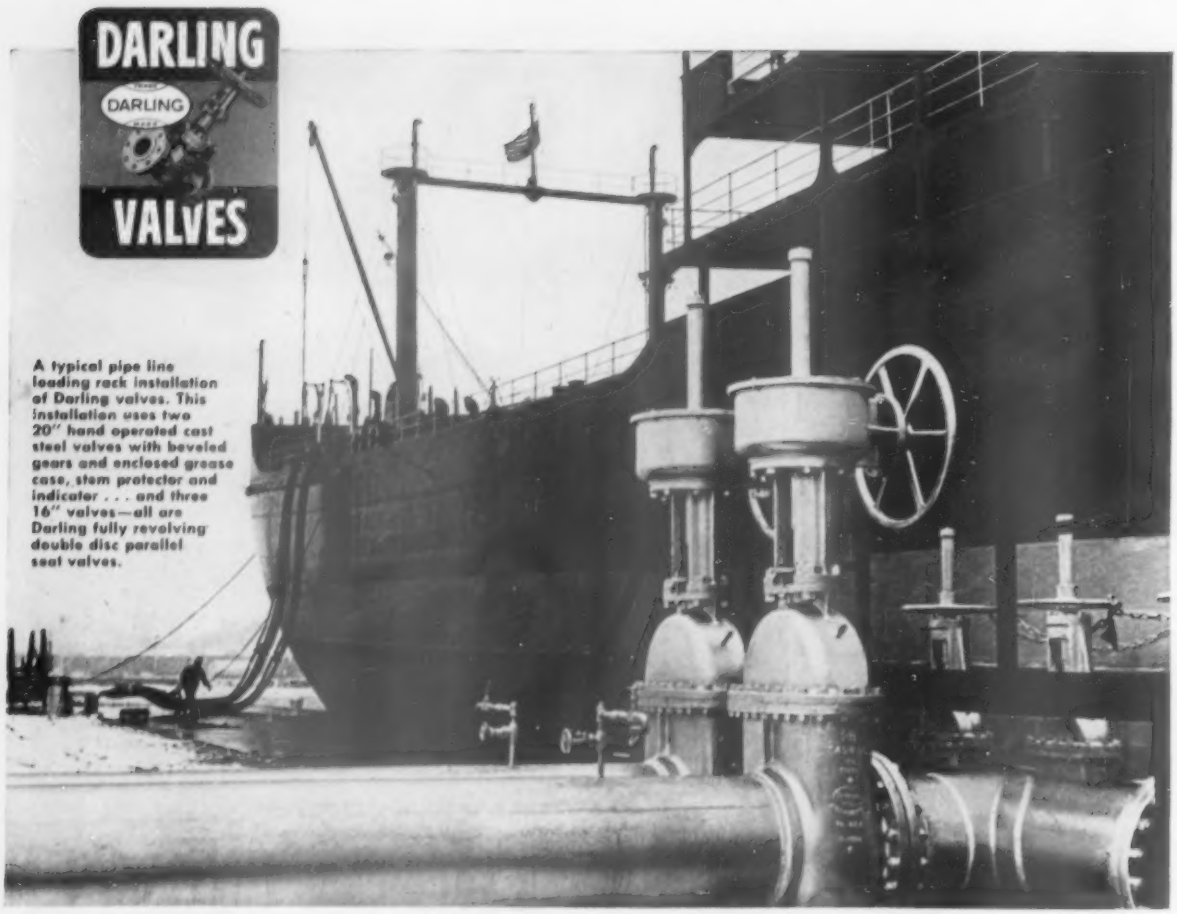
JAMES R. ROBINSON
Salesman

MARK A. TAYLOR
Salesman

J&L STEEL

Jones & Laughlin
STEEL CORPORATION
SUPPLY DIVISION – TULSA, OKLAHOMA
Serving The United States and Canada

P·E·S·A
PARTNERS IN PETROLEUM PROGRESS



A typical pipe line loading rack installation of Darling valves. This installation uses two 20" hand operated cast steel valves with beveled gears and enclosed grease case, stem protector and indicator . . . and three 16" valves—all are Darling fully revolving double disc parallel seat valves.

How they help keep cargo schedules with DARLING Revolving Disc GATE VALVES

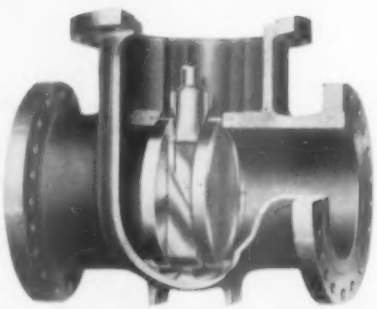
TROUBLE-FREE valve service on tanker loading racks is helping to build an enviable valve service record for Darling *fully revolving double disc parallel seat* gate valves.

The big advantage here, as in all Darling *revolving disc* gate valve installations, is the cut in down time. These unique cast steel gate valves automatically compensate for valve body distortion. Moreover, Darlings give better service longer because their *fully revolving double discs* distribute disc and seat wear uniformly. And Darling valves are always easier to operate, even under severe pressure loads or radical changes in temperature.

You save time too when it does become necessary to service Darling valves because all working parts can be replaced without removing the valves from the line. And any one, or all of the four working parts, can be quickly replaced on the spot.

Wide Range of Sizes

These Darling *fully revolving double disc parallel seat* gate valves are available in a wide range of sizes and types for all gas and oil line requirements. Ask for general descriptive literature or outline your specific service needs so we can send you the exact information you need.



Cutaway showing the extreme simplicity of Darling's unique fully revolving double disc parallel seat gate valve principle.

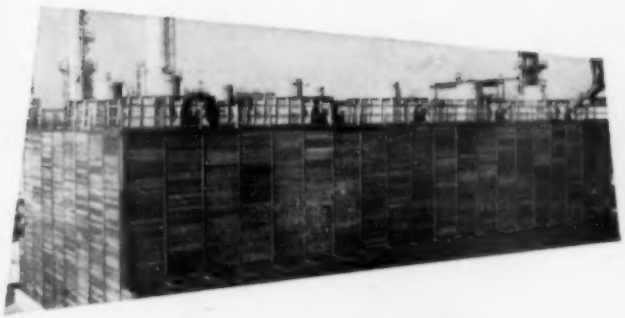
DARLING VALVE & MANUFACTURING CO.

Williamsport 1, Pa.

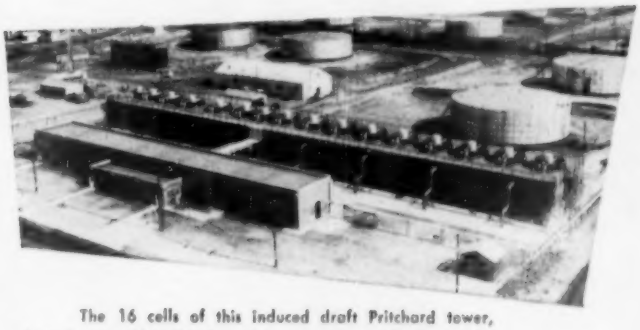
Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ontario

YOU CAN SAVE A LOT OF MONEY...

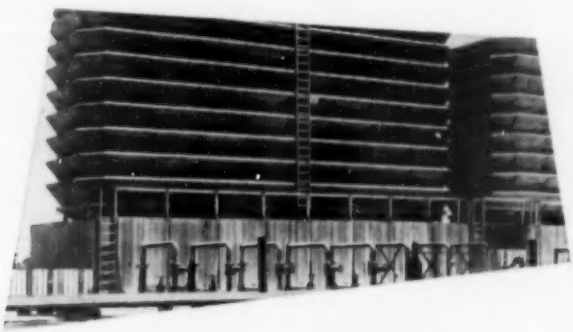
. . . in the vital cooling processes of your refinery operation. How? Install a Pritchard Cooling Tower! Each of the hundreds of Pritchard cooling towers operating throughout the petroleum industry was designed, built . . . *and guaranteed* . . . to do a specific job. Such accurate design, engineering and construction result in operating efficiencies that assure proper cooling with maximum savings. And the hundreds of satisfied customers enjoying these savings are proof that you can depend on Pritchard—a founder member of the Cooling Tower Institute—for the right answer to any cooling problem *you* have.



18,760 gpm of refinery process water are cooled from 120° F. to 85° F. in this Pritchard induced draft cooling tower at the Pure Oil Company refinery, Toledo, Ohio.



The 16 cells of this induced draft Pritchard tower, built for the Ohio Oil Co., Robinson, Ill., are divided into 9 sections, each designed for a different cooling performance. Total design capacity is 48,000 gpm.



This Pritchard atmospheric cooling tower is cooling process water from an initial temperature of 105° F. to a final temperature of 90° F. for the Sunray Oil Company at Placedo, Texas.

Industry's Partner for Progress

J. F. Pritchard Co.
OF CALIFORNIA
A DIVISION OF J. F. PRITCHARD & CO.
Dept. 349 210 West 10th St., Kansas City 5, Mo.

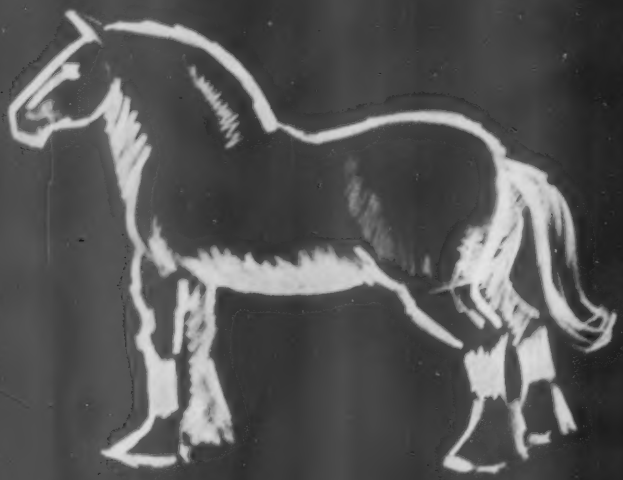
COOLING TOWERS
SPECIALIZED HEAT EXCHANGERS
GAS & AIR TREATING EQUIPMENT

Representatives in Principal Cities from Coast to Coast

In other cooling operations, you'll obtain maximum heat transfer . . . with maximum savings . . . from Pritchard QUINTAIR® heat exchangers. The induced draft arrangement allows more even distribution of air over the surface of the coils carrying the product to be cooled or condensed.

®Registered Trade Name

WHEN CHAIN PERFORMANCE MUST BE AS DEPENDABLE AS A



YOU'RE WISE TO CHOOSE

REX ROLLER CHAIN*

MANY DRILLERS FIGURE IT THIS WAY: "I CAN'T AFFORD SHUT-DOWNS DUE TO CHAIN FAILURE." THAT'S ANOTHER WAY OF SAYING REX DEPENDABILITY IS AN IMPORTANT FACTOR IN YOUR PROFIT.

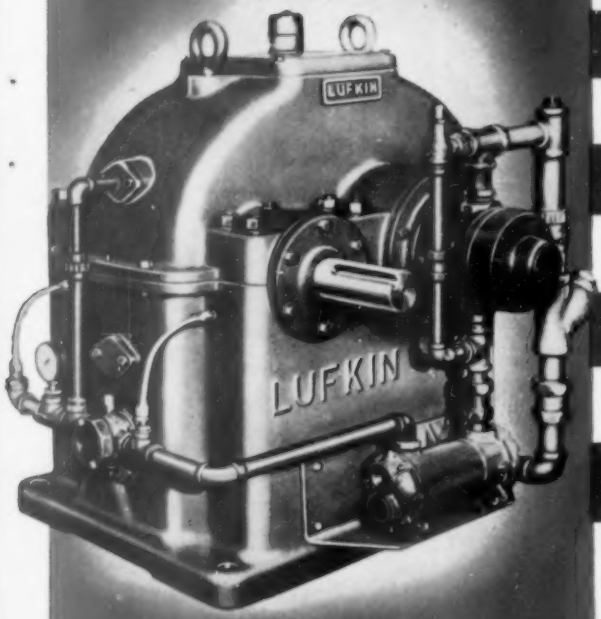
CHAIN BELT COMPANY

ROLLER CHAIN DIVISION
357 PLAINFIELD STREET
SPRINGFIELD 1, MASS.

* WE'VE CHANGED OUR NAME...but the chain's the same. Baldwin-Rex Roller Chain is now called Rex Roller Chain and the Baldwin-Duckworth Division is now known as the Roller Chain Division of Chain Belt Company.

Lufkin

HERRINGBONE GEAR SPEED REDUCERS AND INCREASERS



LUFKIN, TYPE N "HIGH SPEED"

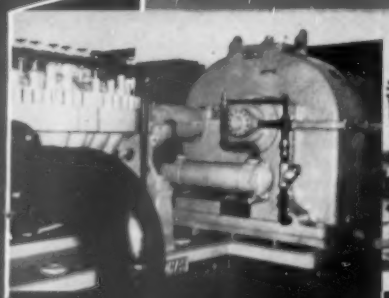
ANY SIZE
3 TO 2000 H. P.

ANY SPEED
0 TO 12,000 R. P. M.

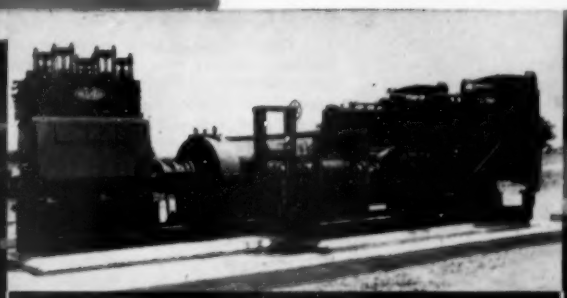
ANY RATIO
1 TO 1 TO 70 TO 1

ANY JOB
WHERE SPEED IS REDUCED OR INCREASED . . . . . .

Eighty Different Sizes From Which To Choose



PIPELINE PUMP



SALT WATER DISPOSAL

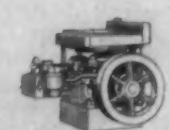
ALSO SPIRAL BEVEL REDUCERS FOR COOLING TOWERS

LUFKIN FOUNDRY & MACHINE COMPANY

LUFKIN, TEXAS

Branch sales and service Houston, Dallas, New York, Tulsa, Los Angeles, Seminole, Oklahoma City, Corpus Christi, Odessa, Kilgore, Wichita Falls, Casper, Wyoming, Great Bend, Kansas.
Lufkin Equipment in CANADA is handled by
THE LUFKIN MACHINE CO., LTD. 14321 108th Avenue, Edmonton, Alberta, Canada.

LUFKIN PUMPING UNITS



LUFKIN-CONTINENTAL-DESSOMER ENGINES

LUFKIN OIL FIELD AND INDUSTRIAL TRUCK TRAILERS

INDUSTRIAL SPEED REDUCERS AND INCREASERS

DIVISION LUFKIN FOUNDRY & MACHINE COMPANY INDUSTRIAL, MILL AND AUTOMOTIVE SUPPLIES

Davidson Drilling Company

Powers Its New Rig with Climax Because . . .

THREE CLIMAX V-85's drive this new Davidson Emsco 500 hoist rig with an 800 compound and transmission. A 16" high-pressure, heavy-duty Gardner-Denver pump is driven from the compounds.

THE FIRST CLIMAX POWERED DAVIDSON RIG . . . a model 1250 Emsco rig, powered by 3 V-120 Climax Engines . . . went into service in 1946 and worked continuously for six years before minor overhaul was necessary.

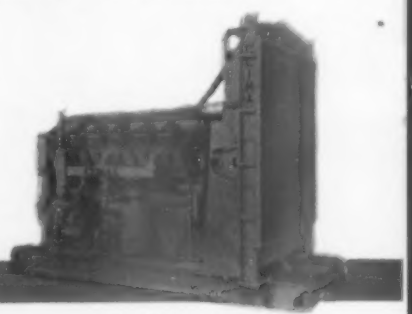
"Climax engines give us the smoothest, most economical power we've ever had."

Years of dependable, trouble-free performance have convinced Davidson Drilling Company that they can operate Climax Blue Streak Engines more economically . . . and more profitably . . . than any other engine on the market. That's why they have powered their newest rig with Climax. They have found that the simplicity in design, plus the heavy-duty construction gives them longer life and minimum down-time. They have found, too, that the smooth vibration-free power of Climax Engines allows them to accelerate faster and responds instantly to variable load demands.

Why don't you get the full story on Climax Engines? Climax Blue Streak Engines operate with equal efficiency on either butane or natural gas. They are making engine history in the oil fields by providing greater efficiency and economy with minimum maintenance. Ask your nearest distributor.

climax

BLUE STREAK ENGINES



CLIMAX ENGINE AND PUMP MFG. CO.

FACTORY
CLINTON, IOWA

208 SO. LA SALLE ST. CHICAGO 4, ILL.
DISTRICT OFFICE
155 CONTINENTAL AVE.
DALLAS 7, TEXAS

DISTRIBUTORS

Harry Cornelius Co.
Albuquerque, N. M.

Diesel Equipment Co.
Wichita & Great Bend, Kans.

Diesel Power Co.
Oklahoma City & Tulsa, Okla.

United Tool Co.
Shreveport & Alexandria, La.

Vern Walton Co.
Coolidge, Casa Grande, & Marana, Ariz.

Wilson's Engine & Equipment Co.
Bakersfield & Long Beach, Calif.

Lewis Diesel Engine Co.
Memphis, Tenn.

Stewart & Stevenson Services, Inc.
Houston and 8 Texas Branches

Equipment Supply Co.
El Paso, Texas

Diesel Power, Inc.
Plainview, Texas

Cullander Machinery Co.
Belzoni, Miss.

Tobin Machinery Co.
Lafayette, La.

They Say—

Scintillometer for Exploration

Dear Sir:

I am very interested in literature concerning the use of the scintillometer, both airborne and on land, as an exploratational tool.

Would you be kind enough to advise me whether instances of the use of such tool for oil exploration have come to your attention? Please, also advise whether The Oil and Gas Journal has published anything along that line and, if so, in what issues; likewise, any books on the subject that you may know about.

Gerardo Joffe,
Magnolia, Ark.

Editor's Note: One of the earliest articles on the subject will be found in The Oil and Gas Journal, April 14, 1952, page 165. This was written by Hans Lundberg, who is credited with most of the early research on the problem. Radiac Co., Inc., New York, has free literature on the subject.

Thanks from Turtle Clubber

Dear sir:

I want to thank you for the excellent article on the Turtle Club written by D. H. Stormont in the July 12 issue of your excellent publication.

It is only through the cooperation of your publication and others that the work of the Turtle Club has been successful.

Hardly a day passes that we do not receive a letter from at least one safety director expressing his gratitude for the work the Turtle Club is doing in promoting the importance of head protection . . .

E. W. Bullard, Sr.,
International Sponsor of
The Turtle Club,
San Francisco.

Liability Insurance

"Practically no company . . . can afford to self-insure all of its liabilities and . . . excess coverage must practically always be considered as a part of any program of self-insurance. . .

"Generally, about $10,000,000—occasionally up to $12,000,000—is the maximum that Lloyd's of London will cover for bodily injury and property exposure for one corporation. The

Leschen engineers tell you how to determine . . .

Proper Use of Wire Rope with Wire Rope Core

What is it? It is a completely metallic rope made with a separate wire rope as a core, instead of the usual fiber core.

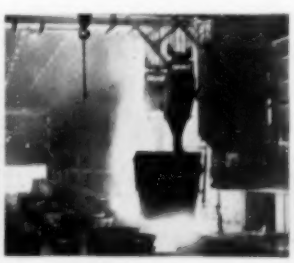
Why is it used? The steel core resists extreme pressure of individual strands on the core under very heavy loads. Here, a Red-Strand steel core rope substantially outlasts a fiber core rope. The extra steel in the core increases rope strength and safety by 7½%, compared with wire rope with fiber core. For occasional heavier loads this eliminates time and expense of changing sheaves, blocks and equipment to suit a bigger fiber core rope.

Red-Strand steel core rope answers the problem of crushing when rope is spooled in multiple layers on small diameter drums and winches—or when heavy loads are dragged or pulled. It also resists the damaging effects of excessive heat.

Where is it used? For extra strength and to resist heavy load pressure: on shovel and draglines—for drag, hoist, crowd and frequently boom ropes; on dredges, trench hoes, cranes and similar heavy duty equipment. To resist crushing: on bulldozers, scrapers, coal cutters, coal loaders, logging, arch and choker lines, and on rotary drilling lines. To resist excessive heat: on hot ladle cranes.

Which make should you use? Red-Strand steel core wire rope is highly recommended by its users for its higher-than-rated quality and longer-than-expected service. That saves money.

What's the next step? Talk to your Leschen distributor or Leschen field man. They're well qualified to answer your specific questions about Red-Strand steel core wire rope—or to help solve other wire rope problems.



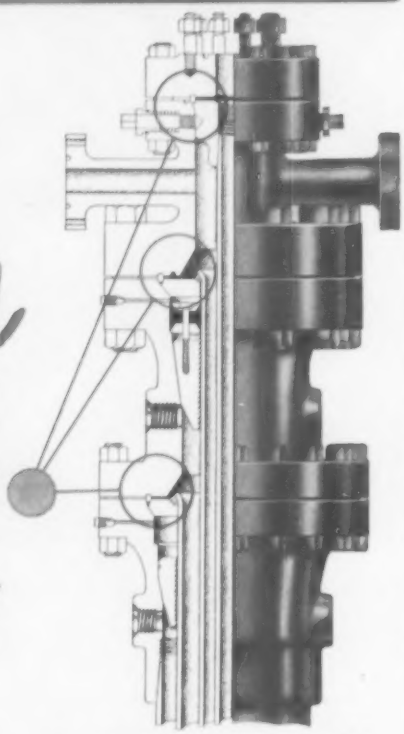
Severe stress, pressure and crushing occur on rotary drilling drums, winches, shovels, draglines, logging lines, and others. Where tons of molten steel are to be lifted by wire rope, great strength and resistance to intense heat are required. Here Hercules Flattened Strand wire rope with wire rope core delivers much-longer-than-expected service.

Hercules Red-Strand wire rope made by
LESCHEN WIRE ROPE DIVISION
The Watson-Stillman Company
(A SUBSIDIARY OF H. K. PORTER COMPANY INC.)
St. Louis 12, Missouri

RECTORHEADS

Seal with Steel all the way

- for Safety
- for Permanence
- for Simplicity



Assembly of Type "RH" Rectorhead Casing Heads with three Casing Strings and Type "M" Tubing Head. Notice how welding ring seats in head body. API Ring Gasket completes the "seal-with-steel."

You wouldn't think of using soft packings between flanges or flanged fittings, particularly where temperatures and pressures are high. Then why use them in casing or tubing heads, where conditions are even more severe, and leaks more disastrous.

When you use Rectorheads you "seal-with-steel." The welded seals, plus API Ring Gasket, never require replacement or maintenance, will not "flow" under high pressure or temperature, will not "freeze" or contract under low temperature, will not burn out or deteriorate. The Rector Welding Procedure is covered in API Std. 6E., Third Edition, January 1952.

Why risk soft seals in your well heads when you don't use them in flanges? Specify Rectorheads and you can "seal-with-steel" between casing strings.

Sold through authorized Supply Stores.

RECTOR WELL EQUIPMENT COMPANY INC

MAKING THE OIL INDUSTRY SAFER

1100 NORTH COMMERCE ST. FORT WORTH, TEXAS

Houston Plant: 2215 Commerce St.

REPRESENTATIVES IN ALL ACTIVE FIELDS

RECTORHEAD RECTORSEAL

American companies will ordinarily not cover such large amounts.

". . . The number of serious gas explosions and the gas-industry accident record in general have brought about a reluctance on the part of American insurance companies to insure the gas-utility industry. Because of this lack of interest on the part of American insurance companies in handling our excess insurance coverage, most of us in the industry have placed our excess liability insurance with Lloyd's of London. . ."

Raymond W. White, manager of claims and safety department, Pacific Gas & Electric Co., in an address at the Pacific Coast Gas Association meeting, Vancouver, B. C.

Fresh Evidence

"Fresh evidence seems to come up every day to support the fact that the oil industry is one of great competition.

"A typical recent event is an example:

"The Armed Services Purchasing Agency called for bids on a supply of oil products the military needed. The answer they got was striking—218 companies sent in sealed bids. The successful bidder was a South Carolina jobber.

". . . Col. Douglas R. Brown commented: 'The public is the real winner of this competition. I've watched it with great satisfaction, seen how it always lets us buy the best oil products at the lowest possible price.'

"Last year, small oil companies received 77 per cent of all regional oil contracts awarded by the military."

Editorial in the July-August issue of The Atlantic Magazine, Atlantic Refining Co. publication.

Crude Out of Balance

"The oil industry is in the throes of a badly out-of-balance crude condition. Imported crude has backed up domestic crude to a critical extent.

"The industry generally, in an attempt to adjust itself to this unbalanced condition, has run more crude at refineries than the refined market warranted, and this has caused a very weak, unsatisfactory products market.

"This is nothing new in our industry. Times like these, from various causes, recur every few years. The adjustment comes when, as now, the inventory and product price situation become critical from a profit angle.

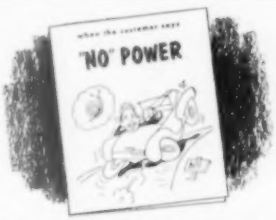
Substantial cuts in refinery crude runs as well as some refinery shutdowns in the United States have been recently announced, and this in the past has presaged a strengthening of mar-

DU PONT

PETROLEUM CHEMICALS DIVISION NEWS

DU PONT

September ★ One of a Series of Interest to the Petroleum Industry ★ 1954



This new booklet helps dealers answer customer complaints on poor power

How do your dealers react when a customer complains that the gasoline they sell lacks power? Do they lose the customer? Or are they able to counter with some ready and convincing sales ammunition?

If they have trouble answering these complaints in a way that keeps the customer coming back, the four-page folder shown above can be a big help to them. It describes the many mechanical troubles that can cause power loss . . . such as poor spark plug condition, improper distributor or carburetor settings, leaky intake manifold and the various factors contributing to low compression. And it discusses them in a simple, easy-to-understand style.

Ask any Du Pont Petroleum Chemicals Division representative for a sample copy, and for information on obtaining them in quantities for your dealers.

New Silica Grease Thickener Announced

Here is a *new type* of grease thickener!

This new additive, Estersil GT, is quite different from any thickener previously used in commercial grease production. It is made by Du Pont and sold exclusively by the Du Pont Petroleum Chemicals Division.

IN THIS PILOT PLANT at the Du Pont Petroleum Laboratory, we will be glad to help you formulate improved greases with Estersil GT and your own oil stocks.

Chemical "Raincoat"

The new material, an estersil, is a pelletized form of finely divided amorphous silica. One of its outstanding properties is a water repellent "raincoat" which is chemically attached to each tiny particle.

This chemically bonded "raincoat" means that you can now make a grease with unusual resistance to washout or breakdown in the presence of water.

Synthetically Made

Estersil GT is completely synthetic. And it was specially developed by Du Pont for grease compounding. With it, you can easily prepare a unique *multi-purpose* grease that will give remarkable endurance on even the most gruelling assignments.

In addition to water resistance, your greases made with Estersil GT will show unusually high thermal stability, superior oxidation stability, and exceptional shear stability under both normal and high temperature conditions. They possess superior handling qualities, too.

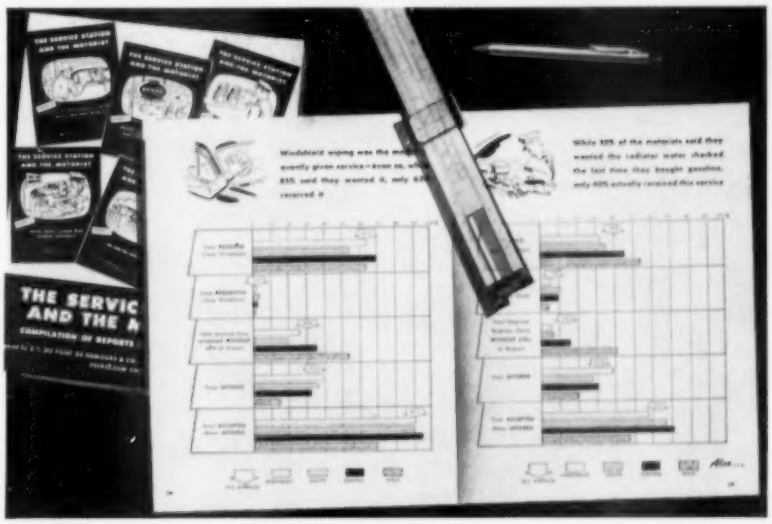
For more information and free samples of Estersil GT, address your request to our Wilmington office.

YOUR CUSTOMERS TOLD US!...

And we have now published their preferences in a single volume to help you evaluate services and promotions.

During the past year and a half we have published six different reports on the extensive Du Pont survey of service station customer buying habits and preferences. But the demand for these individual reports has far exceeded the supply.

Now, to help catch up with the demand and to provide marketing men with the over-all story in one handy reference book, we have combined all the reports into a single volume for selective distribution.


THE SERVICE STATION AND THE MOTORIST
THE SERVICE STATION AND THE MOTORIST
THE SERVICE STATION AND THE MOTORIST
THE SERVICE STATION AND THE MOTORIST
THE SERVIC
AND THE M
COMPILATION OF REPORTS

YOUR CUSTOMERS ARE AN "OPEN BOOK" when you keep handy a copy of this Du Pont survey report, "The Service Station and the Motorist."

The new book covers many different aspects of oil company marketing and customer purchasing habits. And it is arranged in chapters according to the following breakdown:

1. Selection of the service station and customer loyalty to the station.
2. Brand name recognition

OVER

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

DU PONT

PETROLEUM CHEMICALS DIVISION
NEWS

DU PONT

CONTINUED *Survey Report*

and loyalty to brand.
3. Knowledge of gasoline grades and reasons for purchase.
4. Price, credit cards and charge accounts.
5. Oil and TBA purchases.
6. Services wanted by the motorist, asked for by the motorist, and given by the dealer.

By providing you with an accurate reading of customer preferences, this new book can help you tailor promotions for maximum effectiveness and efficiency.

How It Was Done

The survey is the result of thousands of household interviews with service station customers . . . and many more thousands of actual observations at the pump island where purchases are made. The interviews show what customers *think* and *say* about your products and dealer services. The observations, taken at 1,193 different service stations, show what customers *actually do* when making a purchase. The survey itself, which was conducted by National Analysts, Inc., is completely impartial.

Regional and Seasonal Breakdowns

National in scope, the survey is so organized that the findings can be analyzed according to region—for the four main marketing areas of the country. Separate breakdowns by sex, income and age of the respondents are also included, as well as breakdowns for age and price of car.

What's more, the service station observations are catalogued according to seasons – and based on about 6,000 observations during each of the four seasons.

In addition to the one-volume report, the complete information collected by this survey is recorded on IBM cards. Thus, it can be cross-tabulated to provide a wide variety of specialized breakdowns.

As such, we believe this Du Pont survey of consumer gasoline and TBA buying habits to be the most comprehensive, penetrating and accurate ever undertaken by any segment of the petroleum industry.

Special Distribution

Although the new one-volume report on this survey is not available to marketers all the way down the line, it will be distributed on request to marketing executives. And it is ideal . . . as reference material . . . for use by oil companies in preparing condensed marketing information for general dealer distribution.

SEATTLE DISTRICT MANAGER

ROBERT E. HOLETON is the district manager in charge of sales for the Du Pont Petroleum Chemicals Division in Washington, Oregon, and Idaho. His headquarters are in Seattle.

He joined the Du Pont Company as a chemist in 1933. After a wide experience in a number of Du Pont laboratories and semi-works areas, Mr. Holeton was transferred to the Petroleum Chemicals Division in 1949.

Prior to his present assignment in the newly created Seattle District, he was a sales-service representative in the Division's Eastern Region.

He is a graduate of Temple University and a member of the American Chemical Society.

ROBERT E. HOLETON

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kets and perhaps an early return to more profitable operations."

J. E. Boulder, president, Roosevelt Oil & Refining Corp., in a report to stockholders.

He Never Had a "Honeymoon"

"The article 'Drilling Is Big Business' by Carl J. Lawrence as published in the August 23 issue of The Oil and Gas Journal is indeed unfortunate for the drilling industry. The coverage itself is reasonably acceptable, but why the writer or the editor would choose he word and phrasing 'Honeymoon is over now that' is difficult to understand.

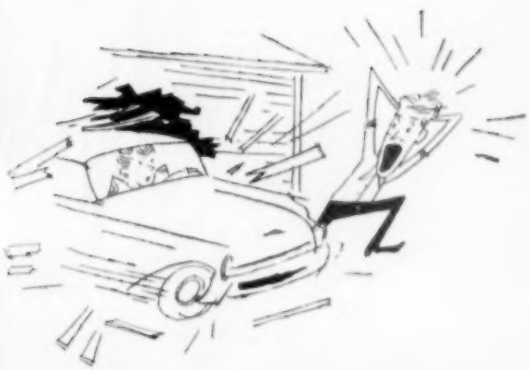
"... Any suggestion that the drilling industry has been on a honeymoon with the employers of its services instead of on a strictly business basis over the years could reflect a misstatement of facts. There is no question about the word honeymoon being misleading. ... "There is every reason to believe that development of the heading was not purposely intended to be uncomplimentary to the drilling industry; however, its choice confused the public thinking. . .

W. S. CHURCHILL

"Reference to the drilling industry as constituting a group of men having no business ability . . . has been the practice of too many writers not intelligently informed in the subject. It is about time that these articles present to the public the factual interpretation that the drilling industry is not an illegitimate, orphaned, uneducated, undeveloped urchin, but an industry ever alert as to sound business principles, scientific organization and equipment performance, research, and advancement of theory and practice to the end of making available to its employers a service acceptable in every requirement and recognized by the oil industry as being second to none among the many independent phases of its business. . ."

W. S. Churchill, chairman of the board, Arrow Drilling Co., in a letter to Karl L. Kellogg, president of the American Association of Oilwell Drilling Contractors.

Editor's Note: Reader Churchill has a point. The contracting business has seldom been so rosy as to be considered a "honeymoon." The headwriter's choice may be a subject of question, but it was based on the use of the word by drilling contractors'



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themselves during more than one of many interviews which preceded the writing.

CALENDAR

SEPTEMBER

14-15 National Association of Corrosion Engineers, South Central region, Dallas.
15-16 American Gas Association, sixth annual accident-prevention conference, Bond Hotel, Hartford, Conn.
15-17 American Petroleum Institute, lubrication committee, Traymore Hotel, Atlantic City, N. J.
15-17 National Petroleum Association, fifty-second annual meeting, Traymore Hotel, Atlantic City, N. J.
16-17 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.
17 Natural Gasoline Association of America, Oklahoma regional meeting, Skirvin Hotel, Oklahoma City.
17-18 Kansas Geological Society, 1954 field conference, Rolla, Mo.; repeat trip September 24-25.
23-24 Western Petroleum Refiners Association, regional meeting, Henning Hotel, Casper, Wyo.
25-27 Diesel and Gas Engine Power Plant Operators Conference, sixth annual conference, Oklahoma A. & M. College, Stillwater, Okla.
27-28 Symposium on Methods for Testing Liquefied Petroleum Gases (ASTM D-2; ASTM D-3, CNGA & NGAA), Statler Hotel, St. Louis.
27-29 Electrical Conference for Petroleum Industry, American Institute of Electrical Engineers, Mayo Hotel, Tulsa.
27-30 Ninth Annual Petroleum Mechanical Engineering Conference, petroleum division of the American Society of Mechanical Engineers, Statler Hotel, Los Angeles.
30 Southern Gas Assoication, conference on transmission management, Shamrock Hotel, Houston.

OCTOBER

1 Southern Gas Association, conference on gas pipeline rights-of-way, Rice Hotel, Houston.
1-2 Standards Engineers Society, annual meeting, Haddon Hall, Atlantic City, N. J.
3-7 ASTM Committee D-2 on Petroleum Products and Lubricants, Sheraton Park Hotel, Washington, D. C.
4-6 Petroleum Electric Power Association, twenty-sixth anniversary meeting, Jung Hotel, New Orleans.
5-6 Texas Mid-Continent Oil and Gas Association, annual meeting, Plaza Hotel, San Antonio, Tex.
5-7 American Institute of Electrical Engineers, Middle Eastern district, Abraham Lincoln Hotel, Reading, Pa.
6-8 Eighteenth Technical Conference on Petroleum Production, Pennsylvania State University, State College, Pa.
7- 8 California Natural Gasoline Association, twenty-ninth annual fall meeting, Ambassador Hotel, Los Angeles.
7-8 American Institute of Mining and Metallurgical Engineers, Pacific Petroleum chapter, fall meeting, Biltmore Hotel, Los Angeles.
10-13 American Association of Oilwell Drilling Contractors, fourteenth annual meeting, Biltmore Hotel, Los Angeles.
10-16 Oil Progress Week.

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This small gas turbine is a proven, working reality!

When it's loading time, and in emergencies, the giant Douglas C-124C, world's largest cargo plane, is vitally dependent on the Solar "Mars" gas turbine. This light weight engine drives the auxiliary generator providing power for cargo winches, doors, ramps, lights, engine starters and other equipment whenever the main engine generators are not operating.

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The basic facts about this practical small gas turbine are its light weight (less than 100 lb); its size (smaller than a two-foot cube); its power output (approximately 50 hp); its simplicity, versatility.

The Solar "Mars" is powering generators on the Douglas C-124C Globemaster, and it will soon be standard equipment on the Lockheed C-121C Super Constellation. It is also used to power portable fire fighting pumps and is under test for many other applications. Solar has also developed a 500 hp gas turbine, the "Jupiter," that is now being field tested for military and industrial uses.

Both the "Mars" and "Jupiter" have proved the theoretical advantages of gas turbines. Two great new small prime movers have been born.

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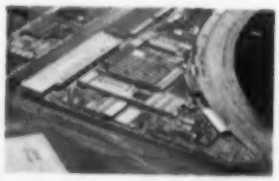

PLANTS. *In San Diego (photo above) and Des Moines. A total of 1,400,000 sq. ft. of floor space. Approximately 5,000 employees. Annual sales over $65,000,000.*

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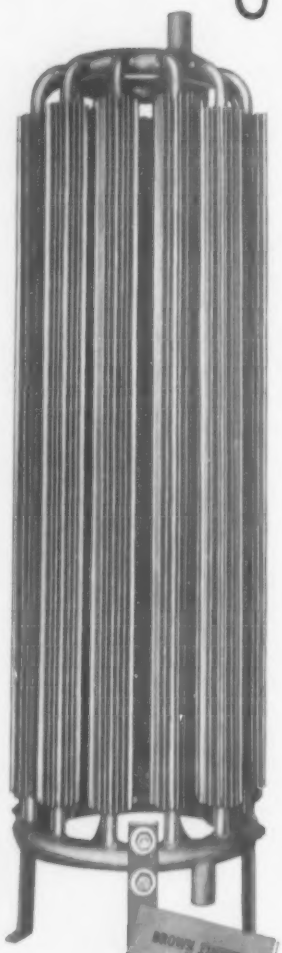

1) **LOWER COST**—Users report that the cost of TF Heaters plus their installation is usually less than the cost of just installing bare pipe coils of equivalent capacity.

2) **VERTICAL MOUNTING**—on legs about 10" above the tank floor brings the entire heating surface in contact with the tank contents—avoids heating through a layer of sediment.

3) **MUCH INCREASED EFFICIENCY**—Finned construction provides approximately 7 times more heating surface per foot of tube length than plain bare pipe—permits more heat to be transferred—faster—at lower temperatures per square foot of surface, avoiding coking or damage to heat sensitive products.

4) **EASY INSTALLATION**—TF-18 heaters pass easily through a standard manhole permitting installation in new or existing tanks. They do not require welding inside the tank. Manifolded into groups or individually trapped.

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11-13 American Gas Association, annual convention, Atlantic City, N. J.
12-15 American Chemical Society, national meeting, Chicago Coliseum, Chicago.
12-15 Eighth National Chemical Exposition, Chicago Coliseum, Chicago.
14-15 National Association of Corrosion Engineers, South Central Region, Dallas.
14-17 Permian Basin Oil Show, Odessa, Tex.
17-20 American Institute of Mining and Metallurgical Engineers, petroleum division, fall meeting, Plaza Hotel, San Antonio.
18-19 Joint Lubrication Conference, American Society of Mechanical Engineers and American Society of Lubrication Engineers, Lord Baltimore Hotel, Baltimore.
21-22 Western Petroleum Refiners Association, regional meeting, Garrett Hotel, El Dorado, Ark.
21-23 Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver.
22-24 Golden Trend Oil Exposition, County Fairs Building, Pauls Valley, Okla.
24-26 Independent Petroleum Association of America, annual membership meeting, Mayo Hotel, Tulsa.
25-27 National Lubricating Grease Institute, annual meeting, Mark Hopkins Hotel, San Francisco.
26-28 Society of Automotive Engineers, national diesel engine meeting, Statler Hotel, Cleveland.
29 Natural Gasoline Association of America, southern regional meeting, Blackstone Hotel, Tyler, Tex.

NOVEMBER

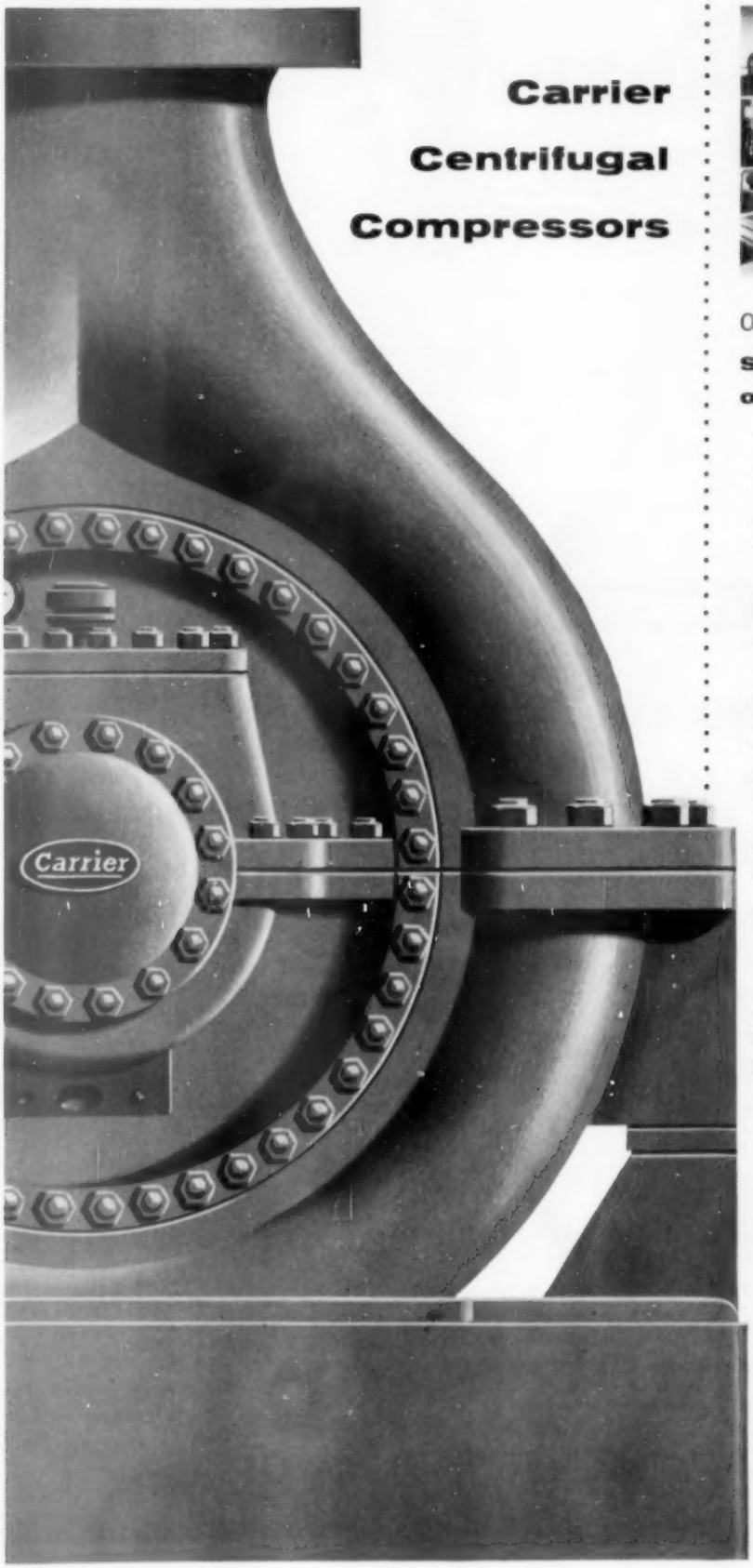
1-3 Geological Society of America, annual meeting, Statler Hotel, Los Angeles.
3-5 Gulf Coast Association of Geological Societies, fourth annual meeting, Rice Hotel, Houston.
4 American Association of Oilwell Drilling Contractors, third annual South Louisiana safety clinic, New Iberia, La.
4-5 Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.
5 Southern Gas Association, conference on field production of natural gas, Herring Hotel, Amarillo.
8-11 American Petroleum Institute, thirty-fourth annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.
11-12 American Association of Petroleum Geologists, Pacific section annual meeting, Biltmore Hotel, Los Angeles.
17-18 North Texas Section, American Institute of Mining and Metallurgical Engineers, and Production Committee of the North Texas Oil and Gas Association, symposium on secondary recovery, Wichita Falls, Tex.
18-19 National Association of Corrosion Engineers, fourth annual conference of western region, Hotel Biltmore, Los Angeles.
18-19 Society of Exploration Geophysicists, eighth annual midwestern meeting, Adolphus Hotel, Dallas.

28-Dec.

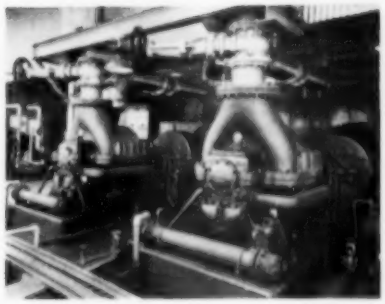
3 American Society of Mechanical Engineers, Statler Hotel, New York.

DECEMBER

2-4 Interstate Oil Compact Commission, winter meeting, Drake Hotel, Chicago.
2-4 American Chemical Society, Southwest Regional meeting, Fort Worth, Tex.
3 Natural Gasoline Association of America, Panhandle-Plains regional meeting, Herring Hotel, Amarillo, Tex.



Carrier Centrifugal Compressors



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JOURNAL
TULSA, OKLAHOMA

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JOURNALLY Speaking

Autumnal Activity

VACATION season is over, kids are back in school, and the terrible summer of 1954 is behind us. This is the time of year when oil men, along with most folks in the Northern Hemisphere, draw a deep breath, take stock of where they are, and square away for a long spell of serious work and progress toward new goals.

Another usual autumn chore is cleaning up odds and ends and making repairs to homes, equipment, and friendships. Under this heading, Dahl Duff, our international editor, has a little repair job he wants to do through the medium of this page.

Due to heat, humidity, or haste, Dahl made a mistake (won't we all?) in reporting, a couple of months ago, that a subsidiary of Gulf Oil Corp. has discovered oil in Sicily. In a side remark of the nature that a lawyer would call obiter dictum, he said that Gulf's substantial foreign production comes from joint operations in Venezuela and Kuwait and that this is the first successful oil find Gulf has made on its own outside the United States.

To correct the record and give credit where credit is due, Dahl now recalls that Gulf, working alone and without partners, discovered oil in Mexico in 1914, in Venezuela in 1924, and in Canada in 1948, and that Gulf has long been one of the most active operators in foreign exploration. There was no intention to minimize the company's accomplishments as an oil finder.

Pictures Tell Tales

SPEAKING of Dahl Duff, we should confess that, working as he does close to New York's Great White Way, he is our authority on what's what in the entertainment world. Apparently Dahl has been spending some time at the movies this summer, but being an oil reporter, he saw oil movies, and, being an analytical reporter, he read between the lines (or saw between the frames, to avoid a mixed metaphor) and made like a drama critic with the following review:

Two films about the oil business, both recently shown in New York, were poles apart, in basic philosophy.

One was the new Oil Progress Week film of the Oil Industry Information Committee, "The Story of Colonel Drake." It told of an achievement of private enterprise, dogged determination, and the initiative of a single individual. The former railroad conductor who drilled the first commercial oil well in the United States met plenty of discouragements, including people who insisted he was crazy. The new O.I.I.C. film is a credit to its producers and sponsors.

The other movie, "Caspian Story," was filmed in Russia and distributed by the Soviets as a documentary effort. It was shown in a New York theater that specializes in Soviet pictures.

The Caspian Story is a pictorial record of oil-field operations behind the Iron Curtain. It shows the Russians going about developing an offshore field around a rocky reef 60 miles out in the Caspian Sea. At times the propaganda seemed somewhat obvious, such as in the frequent closeups of smiling, exuberant roughnecks, welders, and construction hands.

At one point, perhaps without intending to, the Russians disclosed what apparently was a faulty completion. Oil began bubbling up out of the sea not far from one drilling platform. It caught fire, and for a while it seemed as if everything in sight was about to be burned up. Nobody said so, but this looked suspiciously like a casing leak.

Some of the Russians appeared businesslike and efficient, but the entire film had a sort of unreal quality. This came out in the scenes showing the head of the oil trust exhorting the workers, the gathering of the entire oil community to watch a ballet performance, and the frantic efforts of a crew of tank erectors to complete a storage battery before a storm struck.

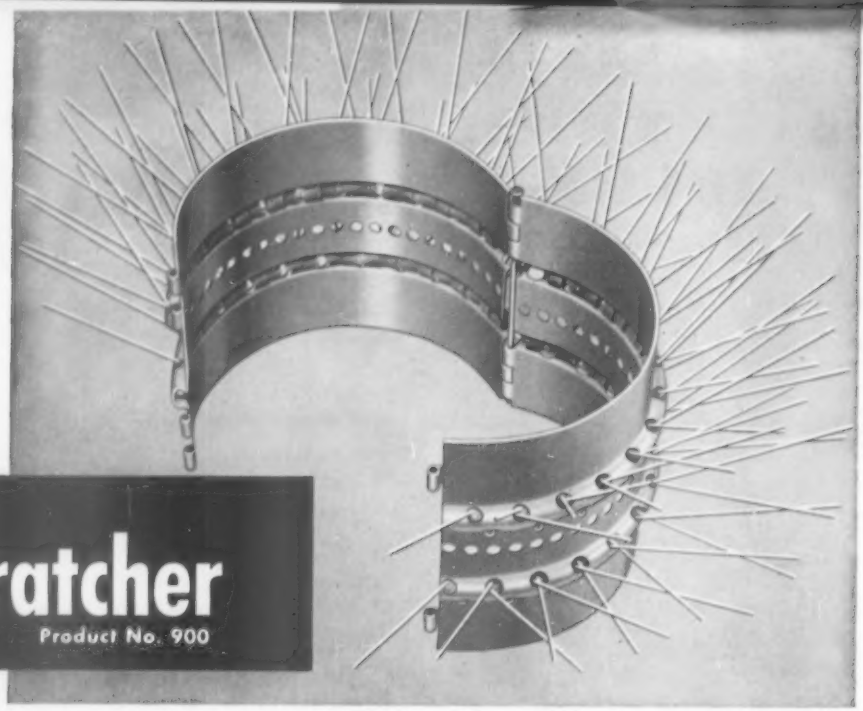
—Henry D. Ralph.

THE NEW

BAKER

Wall Scratcher

Product No. 900



for controlled removal of mud cake to obtain a better primary cement job

One of the most important operations in conditioning the wall of the hole for a primary cement job is the removal of mud cake throughout the intervals to be cemented. The Baker Wall Scratcher was designed specifically to perform that operation.

Hinged for easy installation, the Baker Wall Scratcher is equipped with two full rows of sturdy, spring-loaded scratcher wires that give complete 360° scratching coverage. Each pair of wires is crossed for greater strength in cutting the wall cake into small particles.

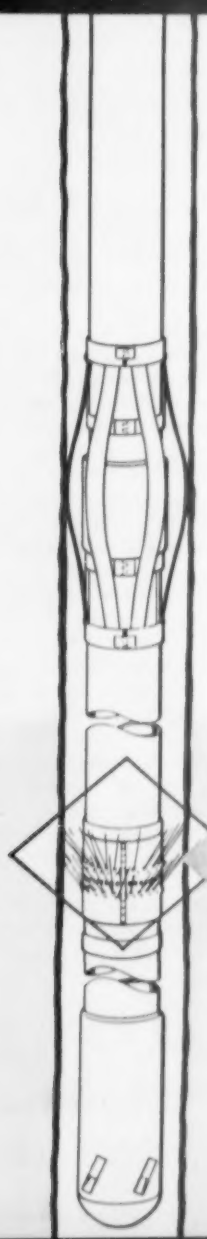
The scratcher wires are pitched upward so that the scratcher can, first of all, be run to scratching depth without causing any significant disturbance of the mud cake. This feature is even more important during the actual hole-conditioning operation, because the up-pitched scratcher wires dig more firmly into the wall cake and are forced into a position of maximum reach and scratching efficiency whenever the casing is raised more than the distance between Stop Rings.

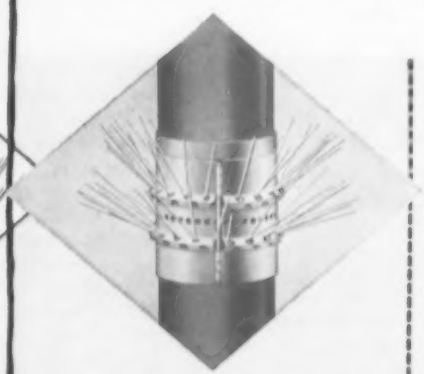
QUICK FACTS *about Baker Wall Scratchers*

1. Spring-loaded scratcher wires are pitched upward to dig firmly into mud cake with maximum reach and scratching efficiency on the upstroke during scratching operation.
2. During down-hole travel, up-pitched scratcher wires ride easily along surface of well bore and minimize scratching action.
3. Mud cake remains undisturbed until casing is raised more than distance between Stop Rings.
4. Scratchers reach scratching depth in good condition, with scratching efficiency unimpaired by excessive distortion of wires and springs.
5. Two rows of sturdy scratcher wires, crossed in pairs, assure full 360° scratching of more surface at each stroke; cut wall cake into smaller particles.
6. Scratcher wires are available in two lengths to meet the specific needs of slim-hole or regular programs.
7. Hinged for rapid, easy installation.

BAKER OIL TOOLS, INC.

HOUSTON • LOS ANGELES • NEW YORK

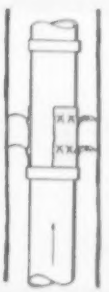




Here is how controlled scratching works →

During down-hole travel, the up-pitched scratcher wires ride easily along the surface of the well bore so that no significant disturbance of the mud cake will result.

When the casing is lifted up out of the slips during the running-in operation, no scratching action occurs. Scratcher remains stationary until contacted by Stop Rings.



On each upstroke during the actual scratching operation, the crossed pairs of up-pitched scratcher wires dig firmly into the mud cake with maximum reach and scratching efficiency.

Let up on the gas pedal, look at the furnace

MID-SEPTEMBER is the traditional time for the oil industry to take a look at where it's been and where it's going.

Labor Day marks the peak of the gasoline season and the beginning of preparations for the heating season. Where do we stand today? Let's look at the record.

Total demand has been disappointing all year—barely ahead of last year. It should pick up a little this fall if general economic activity increases as expected.

GASOLINE IS THE PROBLEM CHILD at the moment. Its consumption has been lower than anticipated, production greater than necessary, and stocks burdensomely high for many months. Inventories now are far higher than they were last fall, and they were too big then. Refiners are going to have to carry heavy stocks of motor fuel all winter—costly and a hindrance to flexibility.

Demand for residual fuel is down but so is production. The steadily downward trend in residual yields reflects refiners' efforts to curtail output of this low-priced byproduct, and stocks of resid constitute no great problem in most areas. California has its own peculiar residual situation; if it were not for mounting inventories on the West Coast, national stocks of heavy fuel would be in good relationship to demand.

The middle distillates deserve attention. Production has been below that of last year, demand roughly the same, and stocks slightly lower. But last year had a mild winter. And there has been a big increase in burner installations. A normal winter will put a drain on stocks and a cold one will put a strain on refiners.

THE OBVIOUS NEED is to shift yields away from gasoline toward distillate. Considering the softness of the gasoline market (and the cost of carrying big stocks through the winter) it may pay refiners to ease off on the so-called "money crop" and stock up a bit on distillate which is certain to show an early increase in demand.

Refinery runs don't need to increase much yet. They can always be boosted rapidly in case of cold weather—provided gasoline storage isn't so full that there's no place to put the motor fuel that must be made along with heating oils.

As for crude supply, it should be kept about as at present, with domestic production inching upward as the season advances but not enough to push crude stocks above their recent level.

If the industry as a whole follows this course—particularly if it makes a real effort to master the gasoline situation—it should enter the winter in reasonably good shape to meet any expected or unexpected vagaries in weather or economic conditions.

Pumping Cement

●At the plant, Lone Star Cements are pumped to packing machines or bulk-cement cars direct from huge storage silos—separate silos being used for each cement. So, when you pump cement at the well—whether the hole is deep or shallow, whether there's a sulphate-water condition, and whether it is securing a casing, a squeeze job, plug back, restoring lost circulation or any other purpose—the Oil Man can be *sure* he is getting the cement he needs for the particular job.

For the right cement in the right place at the right time, just select the Lone Star Cement that's specially designed to fit the job.

LONE STAR CEMENT CORPORATION

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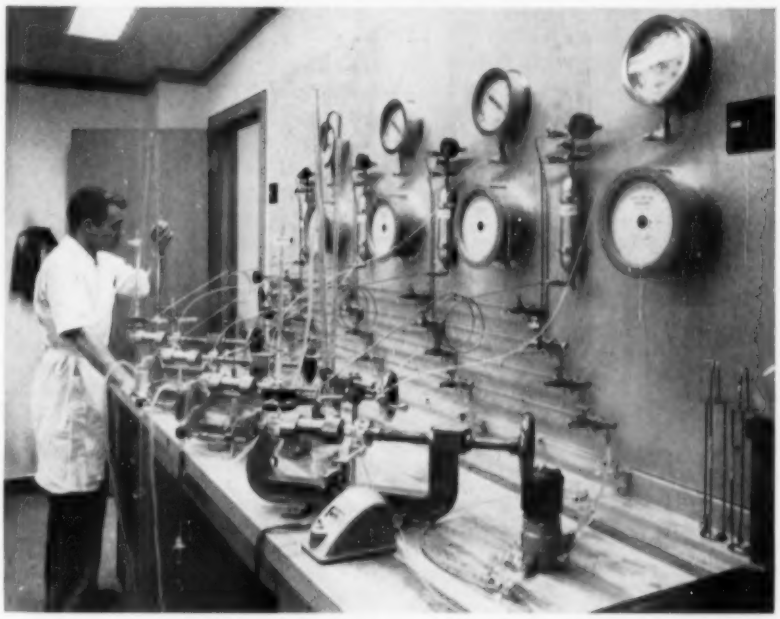
Select Cement to Fit the Job!

THIS WEEK... ...IN THE NEWS

NATURAL GAS—Federal Power Commission announces it will hear arguments protesting its controversial Order 174-A, which clamped tight control over thousands of independent gas producers. . . . Order will remain in effect, however, until the FPC decides—if it should—that further study of the rule is necessary. . . . More than 100 companies already have protested the order, and all of these have been invited to present briefs. . . . Oral arguments set for September 22, with September 20 the deadline for filing briefs.

OFFSHORE—Interior Department expects to take in more than $11,500,000 in its first offer of leases on the Continental Shelf off Louisiana next month. . . . Leases on 199 tracts totaling 748,000 acres will be offered with minimum bonus of $15 an acre. . . . In contrast, operators show little interest in a similar offering of shelf tracts off Texas. . . . Only four tracts off Texas nominated by September 3 deadline. . . . Louisiana list includes the areas once withdrawn because of state's seaward boundary claims, indicating Interior Department is not conceding Louisiana has valid claim. . . . ¶Humble adds seven-passenger helicopter to "whirlybird" fleet serving company's offshore operations. . . . New craft allows company to transport all personnel by air. . . .



LATEST IN PETROLEUM RESEARCH was unveiled last week when Humble Oil & Refining Co. officially opened its new research center at Houston. The multimillion-dollar center will house about 330 scientists and technicians who will specialize in exploration and production research. Fred E. Roberts, above, junior petroleum engineer, conducts a core test in one of the well-equipped labs in the center.

PIPELINES—Four newly formed companies headed by Wiley F. Moore, Atlanta, Ga., and Jack Frost, Dallas, complete planning for three crude lines, two products lines, and two refineries. . . . Construction on first phase of $100 million program may start by the first of the year. . . . Financing of projects completed. . . . ¶Brown & Root, Houston, awarded contract to lay world's longest submarine line. . . . 48-mile carrier will gather oil and gas in tidelands off St. Mary Parish, Louisiana, for Magnolia, Continental, and Newmont. . . . ¶Panhandle Eastern Pipe Line receives Federal Power Commission construction permit for the first phase of a $66,750,000 expansion. . . . Construction slated to start in October on 295 miles of big-inch natural-gas lines in Missouri, Illinois, Indiana, Ohio, and Michigan. . . . ¶ICC reports pipeline traffic and operating revenues up for second quarter. . . .

EXPLORATION—Interest in Delaware basin portion of Lea County, New Mexico, stimulated by encouraging shows from Continental's 2 Bell Lake Unit. . . . Well is in zone that blew out 1 Bell Lake Unit. . . . ¶New lower Spraberry pool in Borden County, West Texas, opened by Phillips Petroleum 1 Quartz. . . . ¶Exploration program in Alaskan interior planned by American group on 256,000 acres of public lands 200 miles northwest of Fairbanks. . . . ¶Sooner Petroleums, Ltd., Regina, claim wildcat discovery near Daly field in Manitoba. . . .

GOVERNMENT—National Oil Jobbers Council predicts end-use controls on natural gas and possibly oil charging that protection of coal industry is aim of presidential fuels study committee. . . . ¶John Jarman, Oklahoma congressman, threatens congressional probe of General Services Administration because government purchasing agency has exempted petroleum products from Buy American Act. . . . GSA contends suppliers are unable to assure Government their products contain no imported petroleum. . . .

TECHNOLOGY—Stanolind discloses new method of removing water blocks from producing formations. . . . Application of new technique to 90 wells increased production 13½ bbl. per day per well on the average at an average cost of $32 per barrel of additional daily output, company says. . . . Method uses surface-active agents dissolved in crude oil as injection medium. . . . Humble opens multimillion dollar research center at Houston to house 330 scientists and technicians working on new exploration and production methods. . . .

INTERNATIONAL—Pemex has apparent major oil discovery at Tecolutla, extending the Golden Lane trend southeastward. . . . The well, Miguel Hidalgo 1, said to be most important discovery by Pemex since expropriation of foreign oil properties in 1938. . . . ¶New pipeline links Baghdad refinery with main Kirkuk-Eastern Mediterranean system of Iraq Petroleum. . . . ¶Third confirmation well in French Parentis field nears potential pay zone. . . . ¶Important discovery may open new oil province in West Germany. . . .

More Competition for the railroads will be provided by the recently completed Yellowstone Pipe Line, owned by Continental Oil Co. and Interstate Oil Pipe Line Co., and others. This was the scene August 31 as Mayor Otto L. Brockman formally opened the Helena, Mont., terminal with the traditional champagne bottle.

Part Of The Crowd which witnessed the formal opening of the Helena station. More than 2,200 visitors thronged the plant on opening day. Yellowstone will move products from the Billings refineries of Carter Oil Co. and Continental as far west as Spokane, Wash., replacing tank-car shipments and enlarging the companies' marketing area.

New applications, wider networks mean . . .

Big Expansion in Product Lines

C. O. Willson

ARE product pipelines to expand more rapidly in the future to become increasingly important in transportation and competitive marketing?

Competent observers generally answer "yes" with some predicting that future growth will include applications of product pipelines not considered feasible in the past. A few vision a vast network of lines comparable in many respects to the trunk and principal lateral lines of the country's natural gas systems.

Under such a program, product lines would ultimately connect to practically all of the large and medium-sized consuming centers except those located immediately adjacent to the coastal ports.

Recent growth . . . How far the domestic oil industry has gone over a period of less than 25 years is shown in the accompanying tables and chart. Current data reveal that 33 per cent of all gasoline, kerosine, and distillate refined in this country is being transported in pipelines before distribution.

In the first 6 months of this year, 38 per cent of the domestic gasoline demand was transported by pipeline, 26 per cent of the kerosine and 24 per cent of the distillate. For the same period, 4,065,000 bbl. of liquefied petroleum gases were shipped by pipeline.

Current figures are impressive in depicting recent growth and plans for the future in product lines. Approximately 1,000 miles of new lines have been completed so far this year and 2,110 miles are under construction at this time.

Furthermore, approximately 1,600 miles of new lines are planned, the actual construction to start later this year or in 1955. This total does not include the product line which the American Pipe Line Co. proposes to build from Beaumont, Tex. to the Newark, N. J. area nor the planned conversion of the "Little Inch" from Texas to Pennsylvania from natural gas to products. The American company which has been granted a large accelerated amortization by the government would consist of 1,425 miles of 24 and 26-in. The "Little Inch," operated during the war as a product line, is 20-in.

Market significance . . . Students of the industry agree that the ending of the postwar petroleum shortages and the coming of surpluses over the past 2 years have increased the desirability of product transportation by pipeline. Competition for markets has brought price concessions at refineries and product lines present a possibility of offsetting part or all of this decline with savings in transportation costs.

One of the accompany tables shows representative rail and pipeline rates on products now effective between Mid-Continent points of origin and destination points in the Middle West.

In general, these rates are typical where the railroads and pipeline carriers are competitive in the transportation of refined products involving similar distances.

Under special conditions the railroads have made low rates effective—particularly on trainload lots—to compete with threatened pipeline competition and have thus forestalled the building of lines. But in hearings involving rates the railroads now generally concede that they cannot compete with pipeline transportation. Usually the savings in rates to shippers using pipelines over rail are 50 per cent or more.

In the early history of the product lines pipeline operators charged users approximately the same as the rail rates. At that time the owners were the sole users of the lines and the benefits came not from the low rates, but from the earnings of the pipeline companies. They were substantial and resulted in quick payouts.

Rate regulations of the Interstate Commerce Commission, government-enforced ceilings on earnings, competition between pipelines, waterways and trucks, and the application of common carrier practices, have changed the original concept of product lines. Present conditions gradually evolved to meet changing conditions within the oil industry.

The 33,000 miles of product lines either directly or in combination with one or more other means of transportation are competitive and have become controlling in the domestic marketing of petroleum products at most interior points.

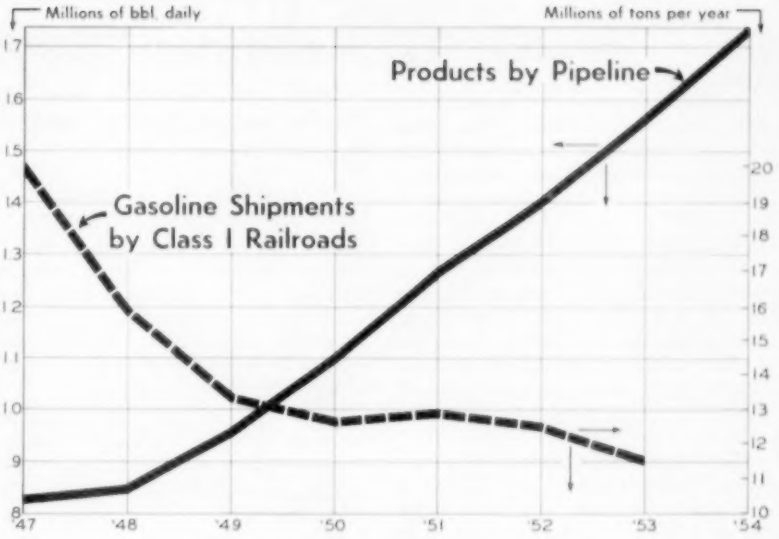
Buyers benefit . . . With adequate and often excess supplies, competition for outlets among sellers has brought about a situation in which all or a large part of the cost advantage of product lines has not accrued to the refinery sellers but to the wholesale buyers and consumers.

The net result is that quotations in effect cover delivered prices at pipeline terminals. Published quotations such as those of the Oklahoma (Group 3) market are still recognized but spot sales and long-time contracts are usually quoted below the published tank car prices so that a large part or all of the lower transportation costs benefit the buyer.

Just how desirable this development is from the standpoint of sound transportation and merchandising practice is a moot question among refiners and marketers. The main point here is that these competitive conditions prevail and tend to make further expansion of product lines mandatory. With no basic changes in sight in competitive and transportation conditions, this trend appears certain to continue indefinitely.

Refiners without the product pipelines find themselves more and more restricted in their marketing. Sales based on tank car shipments cannot compete. Others desiring to expand refinery output find they can only do so profitably by building or encouraging others to build product lines to the needed markets. The result has been a steady increase in capacity since World War II, particularly outstanding over the past 2 years.

Types of product lines . . . There are various types of product pipeline services and all have been expanded in recent years. The first lines built in 1930 were used exclusively by the owners.



The initial line of the Phillips Petroleum Co. extended from its Borger, Tex. refinery to a Mississippi River terminal at East St. Louis and was designed to carry gasoline only. A group of Oklahoma and Kansas refiners organized the Great Lakes Pipe Line Co. to deliver gasoline to terminals in the Middle West. The Standard Oil Co. of New Jersey converted a subsidiary—the Tuscarora Pipe Line Co.—from its Bayonne, N. J. refinery to the Pittsburgh area, from crude to gasoline service.

These three types of lines were all successful and were shortly enlarged. Other lines were patterned after them. Lines which have been termed "elongated loading racks" serving one refinery are operating in areas of several hundred miles. These lines along with common carrier systems now cover a large part of the consuming area from the Rocky Mountain states to New England.

Multi-product use . . . The multi-product use of the pipelines has, of course, added to the attractiveness of all types of lines. The first 6 months of this year, according to Bureau of Mines figures, product shipments were divided as follows: gasolines, 73.4 per cent; kerosine, 5 per cent; distillates, 20.9 per cent; and liquefied petroleum gases, 0.7 per cent.

The percentage gain in pipeline distillate movement has been particularly outstanding in recent years. The gain in 1953 over 1947 was 182 per cent which compares with 72 per cent for gasoline and 75 per cent for kerosine.

With increased volume have come enlarged systems and greater flexibilities. The Sinclair system is transcontinental, linking its refineries at Houston, Tex., East Chicago, Ind., and Marcus Hook, Pa. Products can be moved in either direction from the connecting

GROWTH IN PRODUCT PIPELINE MILEAGE

Dec.—	Interstate miles*	Total miles†
1945	9,781	14,492
1946	11,562	17,083
1947	11,828	17,476
1948	13,692	20,230
1949	14,133	N.A.
1950	16,374	20,881
1951	18,836	N.A.
1952	19,305	27,155
1953	N.A.	30,535
1954	N.A.	33,750

*Confined to companies reporting to Interstate Commerce Commission. †Includes both interstate and intrastate lines. Data for 1953 and 1954 estimated. N.A.—Not available.

SHIPMENTS BY PRODUCTS (FIRST 6 MONTHS)

Product—	Shipped by pipeline	Percentage of total
Gasoline	229,880,000	73.4
Kerosine	15,692,000	5.0
Distillate	65,773,000	20.9
L.P.G.	4,065,000	0.7

GASOLINE AND DISTILLATE RATES FROM OKLAHOMA (GROUP 3)

(Cents per gallon)

To—	Rail rates— Gasoline	Distillate	Pipeline, Gaso. and dist.
Chicago	3.947	3.532	1.381
Des Moines	3.264	2.936	0.857
St. Paul	3.947	3.532	1.381
St. Louis	3.188	2.851	*1.143
Omaha	3.188	2.851	0.881
Fargo	5.085	4.553	1.786

*Gasoline only.

refineries, an important factor in the seasonal demand adjustments. Similar practices are effective in smaller systems.

Another development has been the interconnecting of systems. This, along with the exchange of products, has enlarged marketing territories and resulted in lower delivered costs.

Lateral lines . . . While product lines were originally conceived as feasible only in long distant shipments with few outlets, that restriction is decreasing in importance. In the eastern part of the United States and at other scattered points, short lines are proving practicable where sufficient volume is available.

This raises the question as to how far the industry can go with lateral lines connecting to smaller markets. Those in close touch with conditions do not agree. Some contend that future expansion will be confined to the major markets which are now fairly well connected to one or more lines with expansion largely limited by increases in demands.

Others feel developments definitely point to the rapid entry of the product lines into new marketing territories. They point to the 77 per cent gain in domestic gasoline demand, and 117 per cent gain in distillate demand from 1945 through 1953 as opening marketing areas for product lines where there was not sufficient demand a few years ago. Mechanical developments which have resulted in economies in the operation of large and small lines are a factor in this expansion. One authority has predicted that in time most communities of 25,000 people will justify a product pipeline connection in the more densely populated areas of this country. Competition in these situations is with trucks rather than railroads.

Inland water competition . . . While several lines are operated in connection with the water movement of products, developments over the past few years indicate that the product lines will continue to supplant inland water shipments. Existing lines parallel inland rivers and the Great Lakes. The fact that the product lines can be operated throughout the year while inland water shipments are usually seasonal is the controlling factor in this situation.

Other factors . . . Then there is the fact that crude-oil pipeline carriers and other concerns not connected with the oil industry, are entering the field of product transportation by pipeline. A large crude oil carrier recently completed a product system connecting New Jersey refineries and consuming centers in the east. A concern organized for that purpose is building a product line to serve refineries and jobbers in Montana. Some refinery operators prefer this type of outside operation over the original situation in which refiners owned and operated the lines.

Finally it is known that the federal Government as a defense measure hopes the growth in product lines will continue. The lines greatly simplify the operation and protection of all petroleum facilities and would tend to ease the strain on other transportation facilities during an emergency.

Treatment Revives Old Wells

TULSA.—Oil production from old wells has been more than doubled in some experimental tests with a new low-cost treatment developed by Stanolind Oil & Gas Co. to remove water blocks from oil-producing formations.

Stanolind uses surface-active agents dissolved in crude oil to reduce oil-water interfacial tensions. When used within critical concentration limits the technique results in water movement, apparently in the form of an unstable emulsion of water in oil.

Agent used in field trials is known as Atpet 931 and is manufactured by Atlas Powder Co. Conventional well-treating pump trucks and other equipment were used.

Stanolind reports 90 wells have been treated with the new agent, resulting in increased production of about 1,217 bbl. daily. Most of the tests was set at about $39,000, or approximately $430 per well.

Average payout time has been about 20 days, and the cost of increased production has been about $32 per daily barrel.

Tests favorable . . . Results obtained by the new treatment have been described as "spectacular."

At one Gulf Coast well, no production could be obtained immediately following workover to repair casing leaks. Several cleanouts were made in a futile effort to revive production. After treatment with 1,000 gal. of crude oil containing 1 per cent Atpet 931, the well produced a large quantity of water on gas lift and a week later it began to flow.

In a test 12 days after treatment the well produced 20 bbl. of water and 67 bbl. of oil.

Production increases have been noted for months following treatment with the new agent, the company reports.

Output of a West Texas well increased from 12 bbl. of oil per day to 40 bbl. daily after treatment. Four months later the well's production rate had risen to 47 bbl. of oil daily.

Another 35-bbl. well in the same area showed no change in production immediately after treatment. But within a month production had increased to 82 bbl. of oil per day.

Technical aspects of the new process will be explained in a paper to be presented at the fall meeting of the petroleum branch, American Institute of Mining and Metallurgical Engineers, in San Antonio, October 17-20. The process will be offered to the oil industry through service companies in the near future.

Deep Rock Sale Approved

TULSA. — Stockholders of Deep Rock Oil Corp. last week approved sale of the company's physical properties to General American Oil Co. of Texas for $27,000,000.

Deep Rock president W. H. Garbade said 76 per cent of all outstanding shares favored the sale. Only 1.5 per cent opposed. Formal closing of the deal is expected to be completed this month, Garbade said.

The sale to General American involves virtually all Deep Rock producing properties, its Cushing, Okla., refinery, and its pipeline and marketing facilities.

The sale provides that Deep Rock will lease the refinery, pipeline, and marketing facilities from General American for 8 years at an annual figure of $250,000 and will have an option to buy back the properties *(The Oil and Gas Journal, July 19, page 64).*

Stanolind to Close Refinery

VIVIAN, La.—Stanolind Oil & Gas Co. will close its 7,000-bbl. refinery here next April and turn over the facilities to Pan Am Southern Corp.

Both Pan Am and Stanolind are wholly owned subsidiaries of Standard Oil Co. (Ind.).

The refinery, now obsolete, was built in 1929 by Dixie Oil Co., one of the companies consolidated to form Stanolind in 1931. The refinery has been operated by Stanolind since that time.

Pan Am Southern Corp. operates refineries at El Dorado, Ark., and Destrehan, La.

Gasoline Taxes Still Climbing

Dahl M. Duff

TAXES on gasoline, the petroleum industry's money crop, continue to edge higher year by year.

No one objects to good roads, particularly after a Sunday drive in a congested city area, but higher taxes do not necessarily mean more and better roads.

A number of states still divert large sums of their gasoline tax money into other general state activities. Then there is the question of building the righ kind of roads at the proper places, and, most importantly, whether present highway revenues are sufficient to provide them.

The unweighted average gasoline tax

	Gasoline taxes: Postwar increases (cents per gallon) '45	'46	'47	'48	'49	'50	'51	'52	'53	'54	Tax rate, 9-1-'54	Price excl. tax†	Per cent tax‡	Thousands of dollars: Highway user tax, 1953¶	Highway user tax, 1952¶	Diverted to non-highway use, 1952	Per cent of diversion, 1952
Alabama											6	$.220	§41	53,875	49,346	2,452	4.9
Arizona											5	.238	29	22,543	20,409		
Arkansas											6.5	.225	38	39,104	37,361	1,385	3.7
California			1.5						1.5		6	.217	37	357,431	306,816	58,953	19.2
Colorado			2								6	.210	38	36,153	34,055	63	0.2
Connecticut			1								4	.169	36	37,529	35,169		
Delaware					1						5	.210	33	8,245	7,570	3,161	41.8
District of Columbia			1					1		1	6	.215	37	14,931	13,858	2,590	18.7
Florida											7	.204	44	105,065	96,650	25,324	26.2
Georgia					1		–1				6	.223	36	62,598	59,159		
Idaho	1										6	.245	33	17,132	16,232		
Illinois							1		1		5	.220	32	180,740	142,536	1,243	0.9
Indiana											4	.224	27	82,068	76,662		
Iowa	1								1		5	.214	33	71,887	64,688		
Kansas		1			1						5	.189	37	48,272	44,877	142	03.
Kentucky				2							7	.209	43	63,262	67,538		
Louisiana				2				–2			7	.201	45	53,526	56,790		
Maine			2								6	.209	38	22,634	21,445		
Maryland			1						1		6	.209	38	57,613	50,084		
Massachusetts							1.3		0.7		5	.189	37	74,270	57,141		
Michigan							1.5				4.5	.227	29	143,645	129,627		
Minnesota					1						5	.219	32	70,079	66,828	175	0.3
Mississippi						1					7	.224	40	42,704	40,963		
Missouri								1			3	.209	§29	63,316	49,263		
Montana					1						6	.255	31	19,621	17,952	564	3.1
Nebraska					1	–1			1		6	.205	39	34,235	28,913		
Nevada					1.5						5.5	.246	31	7,577	6,492		
New Hampshire							1				5	.209	35	12,482	12,104	38	0.3
New Jersey										1	4	.159	38	92,669	86,415	18,632	21.6
New Mexico					2		–1				6	.225	38	24,495	22,847	446	1.9
New York											4	.231	26	223,267	213,327	22,541	10.6
North Carolina						1					7	.219	41	104,970	99,695	2,651	2.7
North Dakota							1				5	.227	31	15,275	13,947		
Ohio									1		5	.193	36	178,683	153,365		
Oklahoma	2		–2		1						6.5	.210	41	71,763	67,796	9,067	13.4
Oregon					1						6	.216	37	53,485	49,999	644	1.3
Pennsylvania					1						5	.169	41	190,995	187,081		
Rhode Island			1								4	.169	36	13,119	12,286	4,826	39.3
South Carolina						1					7	.205	44	47,751	45,560	1,093	2.4
South Dakota							1				5	.225	31	17,686	15,631		
Tennessee											7	.204	44	78,970	67,598	979	1.5
Texas											4	.200	30	197,174	187,906	28,867	15.4
Utah							1				5	.224	31	15,829	14,872		
Vermont			0.5		0.5						5	.221	32	10,794	10,244	12	0.1
Virginia		1									6	.199	40	74,299	69,717	309	0.4
Washington					1.5						6.5	.248	34	74,503	72,202	11,681	16.2
West Virginia											5	.242	29	36,176	34,730		
Wisconsin											4	.229	26	69,185	65,003	4,962	7.6
Wyoming							1				5	.240	§33	11,413	10,556		
Total														3,405,038	3,101,306	202,800	6.5
Average tax rate*	4.5	4.6	4.7	4.8	5.1	5.1	5.3	5.3	5.4	5.5	5.5	.214	35				
Fed. gas tax (1½c)							0.5				2						

*Unweighted average, after increases shown for the particular year. †From the August 1 compilation by The Texas Co. It is the per-gallon service station price of regular grade exclusive of tax as reflected in selected cities (one for each state, and not the average state-wide average price). ‡Based on prevailing prices in relationship to the state gasoline tax plus the 2-cent federal tax and some cases (§) an additional 1-cent local gasoline tax. ¶A consolidation of figures compiled by the U. S. Bureau of Public Roads on state motor-fuel taxes, motor license revenue, and motor carrier fees.

in the United States is 5½ cents state, plus 2 cents federal, for a total of 7½ cents. This compares with 6 cents 9 years ago at the end of the war. Steady increases have been made as one state after another hiked its rates.

Seven states now levy a 7-cent a gallon rate, the country's highest. At the end of the scale is one state, Missouri, with a 3-cent rate. Others vary between these extremes. Louisiana had a 9-cent tax for 5 years prior to 1952, but dropped this back to 7 cents after losing substantial revenue by across-the-border sales.

U. S. taxes to stay . . . The effort to induce Congress to leave the gasoline tax field entirely to the states now seems to be a lost cause. The federal Government tapped this source of revenue first in 1932 as a temporary measure, and has been at it ever since. The tax now is 2 cents, and this year the federal treasury will take in close to $850,000,000.

The gasoline tax lineup now stands as follows:

One state with a 3-cent tax; seven states with a 4-cent tax; one state with a 4½-cent tax; sixteen states with a 5-cent tax; one state with a 5½-cent tax; twelve states and the District of Columbia with a 6-cent tax; three states with a 6½-cent tax; and seven states with a 7-cent tax.

Some reductions have been made in state gasoline taxes since the end of the war, as the accompanying table shows. However, in most cases, they rescinded previous increases of the same or greater amount. Since 1945, 36 states and the District of Columbia have hiked their gasoline tax rates.

In six states, municipal or local units of governments are allowed to levy further special taxes on motor fuel. These are: Alabama, local gasoline taxes by 12 counties and 169 municipalities; Florida, five municipalities; Mississippi, three counties; Missouri, 42 municipalities; New Mexico, 43 municipalities; and Wyoming, 8 municipalities.

Fortunately for the motorist, this practice does not seem to be spreading. In 22 states, special local taxes on motor fuel are prohibited. In three states, it is expressly permitted, and in the others, there is no state law one way or the other.

When the amount of the tax—state, federal, and local where it exists—is divided into the retail price of gasoline before tax, the resulting percentage ranges from 26 to 45 in the various states. On this basis, the average tax for the country amounts to 35 per cent of the before-tax price of gasoline.

There are, of course, many other taxes on the motorist, such as licenses, inspection and drivers' fees, taxes on lubricating oil, tires, and the vehicle itself. The growing popularity of toll roads has added another financial burden to the cost of driving a car on main inter-city routes. Toll-road financing is usually set apart from the state treasury since these roads are usually built with revenue from bonds issued by a special agency and retired from proceeds of the toll.

What's ahead . . . The year ahead may bring another round of increases in state gasoline taxes. Most state legislatures are scheduled to hold sessions in 1955. There will be at least some agitation for higher gasoline taxes in some 31 states. In six states—Alabama, Indiana, Iowa, Minnesota, New York, and Wisconsin—the pressure for increases is expected to be especially heavy.

Even without increases in the basic tax rate, state authorities receive a constantly higher amount from the gasoline tax due to steadily rising gasoline consumption. Nevertheless, the demands for increase tax rates continue. In some cases, higher taxes are needed to raise money required for the state's contribution in order to take advantage of an enlarged federal highway aid program.

Diversion of highway revenue to non-highway purposes seems to be declining. Figures for 1952, the last year for which full information is available, shows 6.5 per cent of all state highway-user taxes went into activities other than road-building and maintenance. In 1951, the national diversion percentage was 9.3 per cent; in 1950, 8.4 per cent; in 1949, 7.2 per cent; in 1948, 9.1 per cent; and in 1947, 9.3 per cent. In 1952 California diverted nearly $59,000,000 or 19.2 per cent of its highway revenue. Percentagewise, Delaware was tops, diverting 41.8 per cent of its highway revenue.

The prospect of higher gasoline taxes looks even more likely in view of the 10-year, $50 billion highway modernization program endorsed by President Eisenhower and outlined by Vice President Nixon at the Governor's Conference at Lake George, N. Y., in July. He did not go into detail on financing but indicated a possible cooperative federal-state arrangement.

On the subject of federal highway aid and gasoline taxes, the petroleum industry generally takes a position opposing the idea of linkage of these two functions. The contention that federal highway aid should be considered entirely apart from the federal gasoline tax is based on the fact that federal assistance for highway construction was historically established long before Washington levied its first gasoline tax as a one-year emergency proposition. The federal tax extends to all gasoline, including that used for non-highway purposes, and is a general revenue measure.

Merger Decision Near

ST. LOUIS.—The proposal to merge with the Oil Workers International Union will be considered by members of the Gas, Coke and Chemical Workers Union at their regular convention here this week.

If approved, the merger plan will be submitted to the O.W.I.U. at its annual convention opening November 15 in Cleveland.

Proposed constitution for the amalgamated union, which would be known as the Oil and Chemical Workers International, was approved last month by committees representing the two groups. If both organizations ratify the constitution, a joint meeting will be held later to activate the new union.

Merger of the two C.I.O. unions would double bargaining strength of the oil workers.

Industry Briefs

CLEVELAND.—Standard Oil Co. (Ohio) joins the additive race next week with a general introduction of its new premium gasoline, "Boron Supreme." Sohio has introduced the new gasoline, containing the nonmetallic element boron, in a series of local previews at Ohio service stations. The general distribution of the new motor fuel will be September 20.

TULSA. — Kewanee Oil Co. has moved into its new three-story office building here. The building contains 45,000 sq. ft. and was built so that nine more stories could be added at a later date. One of the features of the building is the map room which contains an electrically operated 18-by-40-ft. map of the North American Continent showing all the known oil fields.

WASHINGTON.—Conrad J. Bauer, former head of the foreign petroleum economics section of Standard Oil Co. (N. J.), was sworn in last week as assistant director for program of the Oil and Gas Division. Bauer will supervise development and coordination of plans to assure a world-wide supply-demand balance for oil and gas and will direct the foreign petroleum supply committee. Bauer's position is a new one in the OGD. He will serve without pay.

Moore-Frost Plans Set

Details of 1,800-mile, six-state crude, products systems and two refineries completed at secret Colorado session

Robert J. Enright

DALLAS.—Planning was completed at a highly secret meeting at Alamosa, Colo., last week for a mammoth, 1,800-mile-plus system of crude and products pipelines and two refineries in the Rocky Mountain-Arizona-New Mexico area.

The huge undertaking is projected by four newly organized and related companies. The pipelines will be built by Ar-Mex Pipeline Co. and Standard Pipeline Co., Inc. The refineries, a 10,000-bbl.-daily plant at Albuquerque and a 25,000-bbl.-daily installation at Coolidge, Ariz., will be built and operated by Navajo Refineries and Arizona Refineries, respectively.

Standard Pipeline is headed by Wiley F. Moore, one of the promoters of Oil Basin Pipeline Co. President of all three of the other companies is Jack Frost, Dallas oil operator and rancher. Biggest stockholder and money man behind the latter three firms, however, is John MacArthur, chairman of the board and president of Bankers Life & Casualty Co., Chicago.

It was on MacArthur's ranch near Alamosa that final plans for the venture were formulated.

Cost . . . It is estimated that entire project will cost somewhere in the neighborhood of $100,000,000.

A Frost representative said preliminary and final financing for the venture had been completed. He said financing has been accomplished within the organization and that no public issuance of stock will be made.

The pipelines . . . The network of pipelines proposed by the companies include three crude lines and two products lines (see map).

The crude lines are:

. . . A 16-in. line from Glendive, Mont., to Guernsey, Wyo.

. . . An 18-in. line from Guernsey to Coolidge, Ariz.

. . . A 16-in. line from Albuquerque to Wink, Tex.

The products lines will run from the proposed Coolidge refinery to Phoenix and Tucson. Size of the 60 and 70-mile lines have not been determined, but it is believed they will be either 6 or 8-in. lines.

Standard Pipeline will lay the 350-mile line from Glendive to Guernsey, plus 150 to 200 miles of gathering lines in the Glendive area. This line will be flexible in that it will deliver crude either into the Platte Pipe Line Co. trunk which passes through Guernsey or into the projected Ar-Mex line going south through Denver to Albuquerque and then to Coolidge.

The Ar-Mex line, stretching about 1,000 miles and crossing the Continental Divide east of Alamosa, will include a 50-mile, 8-in. lateral branching off north of Denver to pick up crude in the Brush area of the Denver-Julesburg basin and a 90-mile, 8-in. branch to pick up oil from the Farmington, N. M., area of the San Juan basin. This lateral will branch off the main line west of Espanola, N. M.

Standard Pipeline also is scheduled to lay the 330-mile crude line from Wink to Albuquerque.

Initial throughput of the Guernsey-Coolidge project is set at about 35,000 bbl. daily, with an ultimate capacity of about 150,000 bbl. daily. The line from Wink to Albuquerque will at first pipe about 10,000 bbl. daily. It will have an ultimate capacity of about 125,000 bbl. daily.

A spokesman for the companies said here last week that an option has been taken on Rocky Mountain crude totaling 35,000 bbl. daily — the planned crude requirement of the two refineries.

The spokesman said that the option was flexible in that the pipeline could take less than this depending on how much West Texas-Southeast New Mexico oil was signed up for delivery to Albuquerque through the line from Wink. The option, secured by a syndicate set up to buy oil, expires January 1, 1956. This means that most of the big project, including the crude lines from the north, the two refineries, and products lines from the Coolidge plant to Phoenix and Tucson, must be in operation by that date or the crude supply might be lost.

The spokesman said Ebasco Services is handling design and engineering for both pipelines and refineries.

Construction schedule . . . The spokesman indicated construction may start by the end of the year on the Wink-Albuquerque line, the refineries, the Albuquerque-Coolidge section of the

Guernsey-Coolidge line, and the two products lines.

Construction will probably not be started on the northern portion of the crude system until next spring due to the approach of winter, he said.

The refineries . . . Size and type of facilities at the two refineries has not yet been decided, pending completion of the study under way by Ebasco.

Officials of the refining companies said, however, that the plants would be modern, integrated installations capable of producing 115 to 145-octane aviation gasoline, motor gasoline, and asphalt.

They said Ebasco will study the possibility of constructing an unspecified type of petrochemical plant near the Albuquerque refinery when it finishes design and engineering work on the refineries.

Construction of the projected Albuquerque plant would increase by more than 50 per cent New Mexico's present refining capacity of about 24,500 bbl. —none of which is at Albuquerque.

There are now eight refineries in the state.

According to the New Mexico Petroleum Industries Committee, these plants are capable of refining slightly more than half of the state's gasoline requirement which last year hit 312,-200,000 gal. Most of the remainder, especially in Albuquerque, is supplied by Standard Oil Co. of Texas by tank truck from its 30,000-bbl. plant at El Paso, Tex.

Frost officials points to New Mexico's increase in motor-vehicle registrations last year of 31,200 or 11.5 per cent and expected similar increases in the next few years as ample evidence that products from the Albuquerque refinery will find a more than adequate market.

These officials say, however, that they have no plans to operate market outlets and have concluded no marketing agreements with other companies so far as the Coolidge refinery project is concerned. There are no refineries in Arizona.

Officials . . . Principals of the Frost companies in addition to MacArthur and Frost are: Ronnie Smith, of Dallas and Memphis, executive vice president of Ar-Mex, Navajo, and Arizona refineries; Ross Bohannon, Dallas attorney, secretary and general counsel of the three firms; Rex Baker, Jr., Houston attorney, treasurer, and assistant general counsel. Moore is chairman of the board of Ar-Mex. MacArthur is board chairman of Navajo Refineries. John Mills, Dallas and Phoenix financier, hotel operator, and oil producer, is chairman of Arizona Refineries.

Versatile system . . . An outstanding feature of the combined project is its immense scope and potential flexibility.

The Ar-Mex and Standard pipeline network could tap four oil provinces—the Williston basin in the Glendive area, the Denver-Julesburg basin in Colorado, the San Juan basin in northwestern New Mexico, and the Permian basin in West Texas and southeast New Mexico.

The oil conceivably could be delivered relatively quickly to any large consuming area of the United States. Though highly improbable within the foreseeable future due to present crude supplies, Rocky Mountain oil could be delivered on the Gulf Coast in an emergency via the West Texas Gulf and Rancho pipelines by reversing the flow of the Wink-Albuquerque branch. It could also reach the Midwest through the Platte Line and others.

By far the most likely future market for the system, however, and one which has created a great deal of promoter interest since the Korean War, lies to the West. The Coolidge terminal of the projected system is about 350 miles from San Diego and about 415 from Los Angeles.

Officials of the Frost group, though expressing a definite interest in the West Coast market, and hinting that the line might someday be extended to serve that market, emphasize that no effort to push through an extension is contemplated soon.

One representative said past events have already proved that it is unwise to try to prod West Coast refiners into taking crude from East of the Rockies through an independent pipeline. He added that the Frost group, when its presently planned system is completed, would be in an ideal position to supply either crude or products to the West Coast.

BIGGEST STOCKHOLDER in Ar-Mex Pipeline, Navajo Refineries, and Arizona Refineries is John MacArthur (right), board chairman of Navajo and chairman and president of Bankers Life & Casualty Co., Chicago. MacArthur is shown with Ross Bohannon, Dallas, secretary and general counsel of the three companies, as he arrived by private plane at Alamosa, Colo., for board meeting of all three companies at which plans for construction of entire project jelled.

Alaska to Get New Tests

FAIRBANKS. — A $2,000,000 exploration program in the Alaskan interior is planned by a group of stateside oil interests which recently leased 256,000 acres of public lands about 200 miles northwest of Fairbanks.

Preliminary survey work in the area was done by Fairbanks Oil & Gas Co., Inc., which was organized in February 1953, by a group of Fairbanks residents. Leaseholders include F. Kirk Johnson of Texota Oil Co., Fort Worth; John Hollern, president of Brooks-Scanlon Oil Co., Minneapolis; James Stewart, Hollywood movie star; and others.

The group announced plans to drill up to five wells on the lease after completing geophysical work now under way.

CANADA

Depth Holder Abandoned

WINNIPEG.—Manitoba's deepest well has been abandoned by Great Northern Carbon & Chemical Co. as a dry hole.

The wildcat, Great Northern-Souris Valley Coulter 16-16, was drilled to 6,840 ft. in the Winnipeg sands immediately above the pre-Cambrian. The well is located in LSD 16, 16-1-27WPM.

Encouraging shows were encountered in the Mississippian, but proved noncommercial. The well was drilled on acreage farmed out from Souris Valley Oil Co., Ltd. It is south of a marginal Mississippian producer drilled by Pascar Oils, Ltd.

The Great Northern well exceeded a depth record previously held by Souris Valley Oil in its Souris Valley Robert Moore 1, which was bottomed at 6,030 ft. in the Silurian. This well is located in LSD 5, 20-1-27WPM.

Manitoba Discovery Made

REGINA.—A wildcat discovery near Daly field in Manitoba has been claimed by Sooner Petroleums, Ltd., Regina.

The well, Sooner - Hayhurst 8-15, flowed 45.5 bbl. per hour during a 3-hour test through a 26/64-in. choke conducted in approximately 30 ft. of open hole. The test was made in the Lodgepole member of the Mississippian formation below 2,530 ft.

The discovery is in LSD 8, 15-9-28wPM about 3½ miles southeast of the southwest corner of Daly field. It is located on a quarter section of freehold acreage farmed out by Sooner from Canadian Superior Oil of California, Ltd.

Sooner, an independent company headquartering here, plans to drill out three additional sites in the quarter. Gold Star Drilling Co. is the contractor.

Pipeline Job On Schedule

EDMONTON, Alta.—In spite of a wet summer, the $58 million construction program of Interprovincial Pipe Line Co. and Lakehead Pipe Line Co. is expected to be completed on schedule.

The program involves 455 miles of 24-in. pipe in Canada and 197 miles of 26-in. line in the United States. The work is being done by four pipeline construction teams in Canada and three in the U. S.

T. S. Johnston, Toronto, Interprovincial president, said enlarging nine pump stations is on schedule and they should be ready for operation by the end of the year.

Migration Rules Tightened

CALGARY.—The Canadian Government has invoked stricter regulations governing the temporary admission of oil-well drillers and derrick operators coming to Canada from the United States.

Such workers in the future must be cleared through the National Employment Service on a national rather than a local basis as in the past. R. N. Munroe, district superintendent of the Department of Citizenship and Immigration, announced the change. National clearance will involve the circulation of applications to all regional offices of the National Employment Service, he explained.

ROCKY MOUNTAIN

Shell Hits in Powder River

SHERIDAN, Wyo.—An important discovery for the Powder River basin is indicated at Shell Oil Co. 1 Hullworth in Sheridan County.

The wildcat recovered 3,760 ft. of clean, gassy oil on a 45-minute drill-stem test of the Ash Creek (Cretaceous) sand at 4,885-4,905 ft. Oil is 35° gravity.

The indicated strike is about 2½ miles southeast of Ash Creek field, a 1952 discovery of considerable importance to the establishment of stratigraphic possibilities in the northern Wyoming area of the Powder River basin.

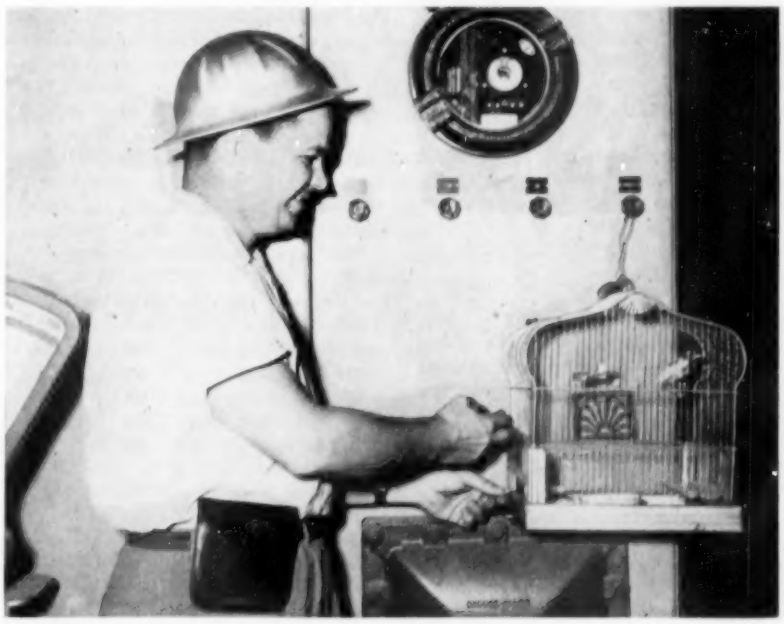
Ash Creek field is more than 100 miles from Powder River basin production and now has 14 wells capable of production.

San Juan Refinery Planned

FARMINGTON, N. M.—Four States-Western Oil Refining Co., will build a new 2,000-bbl.-daily refinery in the San Juan basin of New Mexico about 8 miles east of here.

Construction of the $200,000 plant will start immediately, according to W. S. Wagstaff, president of the firm, and be completed within 90 days.

Four States-Western is a subsidiary of Western States Refining Co., Salt Lake City. Headquarters of the subsidiary also is in Salt Lake.



Something New and Old In Gas Detection

Bill Metrailer, researcher at Esso Laboratories, Baton Rouge, La., stands in front of a new combustible-gas detector while feeding a canary, which long has been used to detect gas in the labs, in refineries, and similar installations. Two of the new detectors have been placed in the lab. Each is capable of continuously analyzing atmospheric samples from as many as eight points in the building where they are used. The scientific detectors sounds a horn in case of danger. But, the detectors won't replace the reliable canaries, which stop singing when gas danger exists. The birds will remain on the job as an extra safety measure.

GSA Probe Threatened

Oklahoma congressman irked at General Services waiver of Buy American Act for Government petroleum purchases

WASHINGTON. — A congressional investigation of the General Services Administration's exemption of petroleum products from the Buy American Act is being considered by Rep. John Jarman of Oklahoma.

A directive issued by the GSA purchasing office in Dallas last April waived the requirement that all oil sold the agency must be exclusively of domestic origin. GSA officials explained that this policy already had been followed for at least 3 years and was designed merely to relieve vendors of the responsibility of guaranteeing that their products were of all-American origin. GSA said vendors might not know that to be so because of the long-standing practice in the industry of comingling imported and domestic oils to secure products of desired specifications.

Jarman is irked because the GSA has been studying the matter for more than 3 months without coming up with an answer to the complaints of domestic independent producers that there is no shortage of oil that would justify the waiver of the act. He told General Services Administrator Edmund F. Mansure that he may ask the House small business committee to "conduct a searching appraisal—both as to the complete facts of the issue and as to the reasons for issuance of a directive by the GSA obviously made without the benefit of access to such facts."

The problem . . . The Dallas office makes nationwide contracts with service stations to provide government agencies with necessary petroleum products. The problem, Mansure said, is whether the agency can be assured of adequate domestic supplies of 100 per cent domestic petroleum products.

"Essentially this is a controversy between the Independent Petroleum Association of America and the National Oil Jobbers Council," Mansure charged in a formal statement. "The former contend there is sufficient domestic oil products for government needs. The jobbers council, which claims to represent 12,000 of the 15,000 independent oil jobbers throughout the country, says that if we do not waive the Buy American Act they will be forced out of Government business."

The Oil Jobbers Council, Mansure said, took the position that "no jobber would be in a position to submit an affidavit that the product which he offered to sell the Government was not made from foreign crude oil or from foreign crude comingled with domestic oil."

A survey of the GSA offices, Mansure said, showed that the eastern and West Coast regions would find it difficult to procure petroleum products if the act is not waived. The midwestern regions could probably make local procurements under the act, but not on a national scale.

GSA already has secured a report on the matter from the Interior Department and has asked the IPAA for information "concerning an appraisal of the present and potential domestic oil supply," Mansure told Jarman.

"We have been concerned with this problem for some time and hope to arrive at a satisfactory solution in the near future," he said.

It's still in effect, but . . .

FPC to Rehear Gas Order

WASHINGTON. — The Federal Power Commission last week agreed to hear argument on all petitions filed for rehearing of its Order No. 174-A, but refused to stay the order while it is under consideration.

More than 105 petitioners for reconsideration have been invited to file briefs in support of their charges against the order by September 20 and will be given an opportunity to present oral argument before the FPC in Washington September 22.

The commission said the hearings were ordered "to provide every opportunity to all petitioners who have questioned the lawfulness" of the order.

"We seek the benefit of all worthwhile advice and assistance to the end that our rules may be reasonable, workable and afford to all every reasonable guaranty of substantive and procedural rights," the commission said.

In view of the large number of petitions that have been filed, the commission suggested that applicants for reconsideration pool their presentation as much as possible at the hearings.

The contested order, however, will remain in full force and effect while the question of rehearing is under consideration. It will be suspended, it was indicated, only in the event the industry convinces the commission that further study of the regulations governing independent producers and gatherers is necessary.

The principal charges leveled against the order are that:

. . . Its issuance without notice and hearing constitutes a deprivation of procedural due process and a violation of section 4 of the Administrative Procedure Act.

. . . The provisions of the order deprive the petitioners of substantive rights guaranteed by due process of law.

. . . The rules transgress the rights reserved to the states by the Constitution and assume authority not delegated to the FPC by the Natural Gas Act.

In defense of its position, the commission contended that in the absence of the rules provided by Order No. 174-A "the more stringent rules generally in effect and applicable to all natural-gas companies would be applicable to producers and gatherers who are also natural-gas companies under the Natural Gas Act, pursuant to the interpretation of the United States Supreme Court on June 1, 1954, in the Phillips Petroleum Co. case."

Gas Line Approvals Totaled

WASHINGTON.—The Federal Power Commission authorized construction of 6,405 miles of natural-gas pipelines during the fiscal year ending June 30. This approved construction will add 1,750,000 M.c.f. of delivery capacity to the nation's gas systems.

The authorized lines along with 251,540 hp. in authorized compressor units will cost $500,881,248.

Operating revenue for pipeline companies set a record during the year ending June 30. The revenue totaled $1,521,045,172 compared with $1,291,364,817 during the previous year.

Pipeline Approved

Panhandle Eastern plans early start on expansion

WASHINGTON.—Panhandle Eastern Pipe Line Co. has received a construction certificate from the Federal Power Commission for the first phase of a $66,750,000 pipeline expansion to increase its delivery of natural gas in Missouri, Illinois, Indiana, Ohio, and Michigan.

Construction is scheduled to start early in October, and company officials hope to complete the initial program by end of the year.

The authorized project, costing an estimated $22,885,000, will include 295 miles of pipeline, most of which will be 30 in. in diameter. It will augment the Hugoton field-Michigan system with 10 loops at compressor stations and one in the Detroit area.

The $66,750,000 construction and expansion program was presented to the FPC for approval in May. The entire program is designed to increase the line's capacity by 50 per cent, to 1,425,000 M.c.f. daily.

Reserves sufficient . . . A certificate to get work under way was issued after the company presented evidence showing it had sufficient gas reserves to meet the new delivery schedule and that no other company is seeking to serve markets which will benefit from expansion of facilities.

First phase of the expansion program calls for a new Mississippi River crossing, with two 24-in. pipes to be laid beneath the river bed.

The over-all expansion program also would include expenditure of $23,580,000 for new compressors and underground storage near Waverly, Ill., improvements in production and gathering facilities, and expansion of lateral lines to distributing areas.

Pipeline Movement Up

WASHINGTON. — Pipeline traffic and operating revenues showed substantial increases during the second quarter this year, according to the Interstate Commerce Commission.

However, 24 of the 61 reporting companies moved less oil during the period and 23 showed a drop in revenue.

Crude and products moved during the 3-month period totaled 913,341,078 bbl., compared with 872,632,408 bbl. during the same period a year ago. Total revenue was $140,351,507, compared with $134,207,015.

WATCHING WASHINGTON

Bertram F. Linz

Coal Has Head Start

End-use controls on natural gas and conceivably some form of limitation on oil are anticipated as possible recommendations of the Cabinet Committee on Energy Supplies and Resources.

Although the study ordered by President Eisenhower is to cover all fuels, the one purpose is apparently a policy that will protect the coal industry against the competition of oil and gas. The coal industry has made end-use control of gas and limitations on imports of residual fuel oil major items on its list of what is needed to keep coal alive.

Otis H. Ellis, general counsel of the National Oil Jobbers Council charges that coal is the principal concern of the committee and supports his charge by the fact that soft coal industry submitted its views some weeks ago, but the oil and other competing industries were only recently given permission to submit recommendations.

In addition to asking for controls on natural-gas consumption and oil imports, the coal industry wants lower freight rates on coal and would make it mandatory upon Government agencies to use only coal as fuel in all federal buildings.

The President's committee was ordered to submit its recommendations to the White House by December 1. It is only now whipping its organization into shape. That means it has less than 3 months to review a mountain of views, argument and recommendations.

Big Business Gets Boost

The Brookings Institution, which made a study of small business some time ago, has just completed a study of big business and has come to the conclusion it is not a threat to our free enterprise system and has not thus far prevented the growth of small business.

The worst Brookings has to say about big business is that it doesn't play according to the generally accepted rules. As Dr. A. D. H. Kaplan puts it, big business seldom conforms to the classical conception of the competitive market—a market of innumerable buyers and sellers, none of whom is individually capable of influencing the total market supply or demand, or the terms of exchange.

In the long run, though, the market is the arbiter, Kaplan says. The large industrial corporations for the most part meet the major test of competition—whether it makes available numerous, varied and significant market alternatives or whether, instead, it tends to narrow and degrade the range of choice.

One of the factors justifying the growth of big business, fully met by the oil industry, is its continuing emphasis on research and new product development, the Brookings analysis maintained. So long as big business continues this emphasis there is little reason to fear it as a threat to the free enterprise system.

Coal Blasts Trade Plans

The coal industry has opened its post-Congress campaign against fuel oil imports with a blast at the administration's plan to secure modifications of the General Agreement on Tariffs and Trade.

The State Department is opening hearings on the agreement this week, in preparation for a meeting of the participating countries in Geneva in November.

In a letter to the chairman of the U. S. delegation, the United Mine Workers of America challenged the right of the administration to decide whether "to trade or not to trade supposed economic advantages based on considerations of tariffs and trade."

"We do not trust, and have every reason not to trust, State Department competency in this field," Thomas Kennedy, vice president of the UMW, declared.

Getting down to the oil problem, Kennedy said the department has "usurped" the power to place a ban on import quotas, a question of national economic policy reserved to Congress. Such action as Congress has taken, he said, indicates clear endorsement of import quotas under circumstances determined by Congress itself.

In short, Kennedy said, the UMW will not appear during the hearings because discussion of the matter under the circumstances might be construed to imply recognition of the agreement "and that is not a position that we care to assume."

Interior expects big things from . . .

. . . Offshore Lease Sale

Bertram F. Linz

WASHINGTON.—The Interior Department stands to reap a minimum of $11,500,000 from its first venture in Continental Shelf oil and gas leasing.

Bonus bids on leases of 199 tracts aggregating approximately 748,000 acres in the shelf area off the coast of Louisiana will be opened by the Bureau of Land Management in Washington October 13. The minimum bonus which may be offered is $15 an acre.

At the same time the department stands to harvest more millions from 523,000 acres to be offered for sulfur leases on the Louisiana shelf.

Early in November the bureau will open bids on leases on the Continental Shelf off the coast of Texas, for both oil and gas and sulfur. Little interest has been evinced in this area, however, and when the deadline for nominations passed September 3 only four had been received. The number of tracts covered by nominations has not been disclosed.

What is involved . . . The 199 Louisiana shelf tracts offered for lease are the same ones that were included in a list issued last month and withdrawn a few hours later with the explanation that Louisiana's claim to an extended state boundary in the Gulf of Mexico required study.

The reissuance of the list, still including tracts inside Louisiana's claimed border, indicated that department officials will not concede that the state has a valid claim until the courts or Congress rule to that effect.

The oil and gas leases, to go to the qualified bidder of the highest cash bonus, will call for a royalty of 16⅔ per cent on production and an annual rental or minimum royalty of $3 per acre. Leases will run for 5 years, or so long thereafter as oil or gas is produced in paying quantities.

The 199 tracts to be offered, selected from recommendations made in 14 nominations, range in area from 1,250 to 5,000 acres and run out in some cases to more than 50 miles from shore. The 748,000 acres represents approximately 5 per cent of the federally held part of the outer Continental Shelf off Louisiana.

A simple bid form has been prepared, calling only for identification of the tract bid upon, the total amount offered, the amount per acre and the amount submitted with the bid, to be one-fifth of the total amount bid.

Sulfur provisions . . . The sulfur leases will run for a period of 10 years, or so long thereafter as sulfur may be produced in paying quantities, on a royalty of 7½ per cent of the value of the sulfur at the well head, but not less than $1.50 per long ton, and an annual rental or minimum royalty of $2 per acre.

Since enactment of the outer Continental Shelf bill in August 1953 the department has approved the drilling of 65 wells on leases previously issued by Louisiana.

Daily production now approximates 8,900 bbl. of oil, 1,500 bbl. of condensate, and 145,000 M.c.f. of gas. There are approximately 185 wells in this section of the shelf area, of which 13 are drilling, 40 are producing oil, 16 are producing gas, 39 (only 8 of which are oil wells) are shut in, and 77 are tests which were abandoned as dry holes.

The Bureau of Land Management is currently validating 290 leases issued by the state in the outer Continental Shelf before the Supreme Court actions. These contain approximately 1,000,000 acres.

Research Center Opened

Humble's new Houston facility provides scientists with up-to-date workshop for exploration, production studies

HOUSTON.—Humble Oil & Refining Co. officially opened its new multi-million-dollar research center here last week, opening the doors for continued scientific probing into new methods of exploring for and producing oil.

The center will provide a workshop for approximately 330 scientists and technicians who formerly worked in several different locations. Work in the center will be devoted to exploratory and production research. Humble conducts its refining and products research in another center opened in 1951 near the company's Baytown, Tex., refinery.

The Houston center contains two buildings. The main structure is a two-story, H-shaped building that includes more than 300 laboratories, shops, and offices and covers approximately 110,000 sq. ft. of floor space. A smaller service building is located in the rear of the main building.

One of the many features of the main building is seven air-conditioned truck bays in the rear of the building for geophysical research. One bay is sealed off from the others to facilitate work

on highly sensitive truck-mounted instruments.

Current work . . . Humble's exploration research is presently centered around four major projects. These include seismic, gravity, magnetic methods of exploration, and well-logging studies.

The geological section of the exploration department is analyzing the structure, growth, and origin of salt domes; studying the compaction and cementation of sandstone; and conducting a study of ground-water problems.

In the production department, one of the current major projects is preparation of an interpretation of thermal measurements. Drilling research also is conducted in the production department. A special petroleum-engineering group is conducting research in offshore drilling and production methods.

Humble, a pioneer in petroleum research, has about 600 employes who devote full time to research. The company has outlined a research program that will cost between $5 million to $6 million annually.

The up-to-date center is another step in a research program that was launched by Humble in 1920 when the company opened its Baytown refinery.

Shell Stacks Record Rig

HOUSTON.—Record-setting Rig 20 has been retired by Shell Oil Co.

The 90-ft. portable unit has been setting and then breaking records for the past 2 years in Big Foot field. It was stacked after 14 years service.

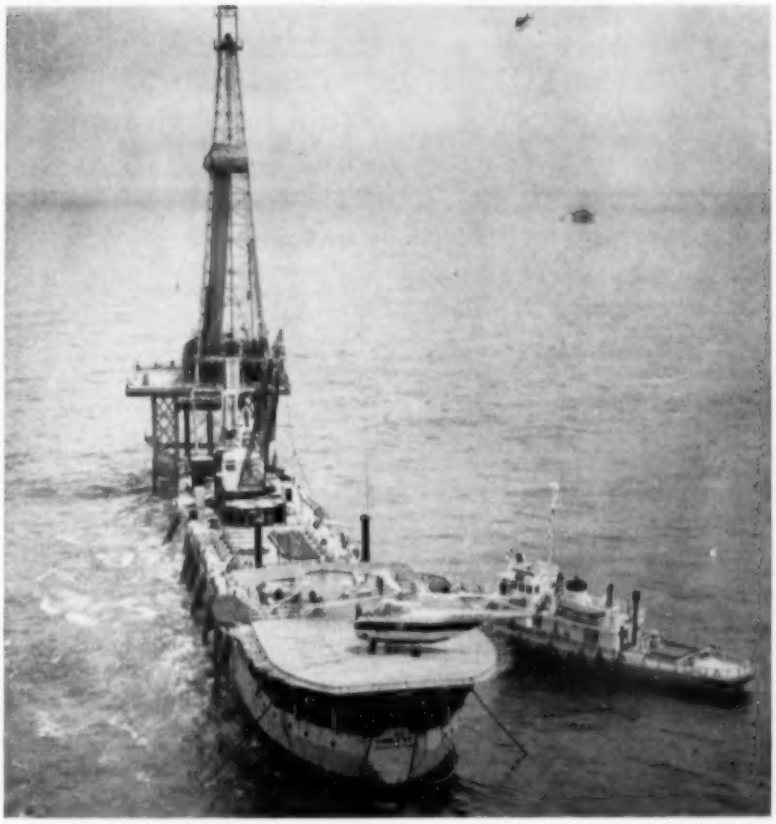
The rig drilled 98 wells in Big Foot in 1953 for a total footage of 311,316 ft., averaging 3.62 days per well. It was well on its way to setting another record this year with a 3.26 days per well average when it was stacked. It has drilled 56 wells this year, 49 of them in Big Foot.

Rig 20 drilled its first well near Stroud, Okla., in November 1940. Since that time it has drilled in Kansas, Michigan, Louisiana and Mississippi in addition to Texas.

Gulf Building Finished

HARVEY, La.—Gulf Refining Co.'s new office building in Harvey has been completed at a cost of $185,000.

The new structure, completely air-conditioned, will house the company's Harvey zone office, which has operational jurisdiction over Gulf Refining's drilling and production activities in South Louisiana. A. C. Hatfield, zone superintendent of production, is in charge of the office.



Humble Extends Gulf Airlift

GRAND ISLE.—By addition of a seven-passenger helicopter to its Gulf fleet, Humble Oil & Refining Co. has extended airlift service to all its offshore rigs in the Grand Isle area.

Two big Sikorsky helicopters fly drilling crews to and from the five rigs operating in the district. Helicopter service will be extended to two additional rigs when they go into operation later this fall.

The big planes average 12 round trips between the land base and offshore rigs daily, in 6 hours and 15 minutes of flying time. They haul about 110 passengers a day.

When the new rigs go into service, the helicopters will make up to 25 round trips daily and carry more than 150 passengers.

In addition to the passenger planes, Humble uses a smaller helicopter for emergency trips and delivery service to its Gulf wells.

A boat trip from Grand Isle to Timbalier Bay areas, about 30 to 40 miles, takes up to 3½ hours. Helicopters make the trip in approximately 30 minutes.

Each of the large Sikorskys is equipped with builtin flotation equipment which would enable it to remain afloat 2 hours if it were forced to land in the Gulf.

Offshore Line Let

Brown & Root gets contract for record submarine line

MORGAN CITY, La.—Brown & Root, Houston, has been awarded contract for construction of the world's longest submarine pipeline—a 48-mile, 12-in. oil and gas-gathering system off the coast of St. Mary Parish, Louisiana.

The line, jointly owned by Magnolia Petroleum Co., Continental Oil Co., and Newmont Oil Co., will tap oil production 25 miles offshore in Block 126, in farthest seaward production yet established on the Continental Shelf. It will extend from Burns Terminal on the coast through Blocks 45-51 in the Eugene Island oil and gas area and angle off to Block 126.

The gathering system will be operated by Magnolia for itself and its partners in joint ventures off the coast

of Louisiana. Construction is scheduled to be completed as far as the Eugene Island area this year and remainder of the line is expected to begin operation about mid-1955.

The new carrier will have a capacity of about 50,000 bbl. of oil daily. The Magnolia-Continental-Newmont team at present is producing more than 5,000 bbl. daily from leases off Burns Terminal.

Production would run considerably more than that except that barging operations have had to be shut down frequently because of foul weather. With new production expected to be added by the time the line goes into operation, the line may carry 10,000 bbl. daily from the start.

Double service . . . Oil and gas from offshore leases will be piped into the Burns Terminal and separated. The gas will go to a transmission company, the oil to refining centers on the Gulf Coast.

The pipeline will be of electric-welded steel pipe, with a double coal-tar-enamel wrap and a 1½-in. coat of reinforced concrete. Wrapping and coating will be handled by Rossin-Richards, Harvey, La. The line will be laid in a trench 3 ft. deep, which will be dug by equipment employing both clamshell and jets.

Unusual operation . . . Oil and gas, and even oil, gas, and distillate, have been commingled before in pipelines but never before in so large a line and in a carrier connecting several fields.

Magnolia expects pressures of about 600 to 800 psi. on the line. Wells that can buck this pressure will be flowed directly into the line. Oil from low-pressure wells will be pushed in by regular pipeline pumps.

A central separator platform will be erected in each field. Fluid will be separated and measured at these platforms, then commingled and returned to the line. Final separation and dehydration will be handled at Burns Terminal.

What small amount of water is produced with the oil will be removed at the well by free-water knockouts.

Shell Plans Building

HOUSTON.—Construction will start soon on a new two-story combination office building-research laboratory here which will house the technical-services division and portions of Shell Development Co.'s exploration and production-research staff.

The building, containing 90,000 sq. ft. of floor space, will be located west of Shell's exploration and production-research laboratory.

MEETINGS

Program Announced

More than 30 papers set for A.S.M.E. conference

LOS ANGELES.—Lewis K. Sillcox, president of the American Society of Mechanical Engineers, will discuss "Trade and Technology" at a banquet climaxing the ninth annual petroleum mechanical conference in Los Angeles September 26-29.

More than 30 papers will be presented at the conference, which is sponsored by the petroleum division of the A.S.M.E.

The program will include papers, addresses, and panel discussions listed below:

September 27

Morning—"Mechanical Features of the Hyperforming Process," Clyde Berg, Union Oil Co. of California, Wilmington, Calif.; "Mechanical Advancements in the Alkylation Process," Robert Stiles, M. W. Kellogg Co., New York; "Excavated Underground Storage for Petroleum Products," R. L. Loofbourow, consulting engineer, Minneapolis; "In Situ Combustion Oil Recovery Process—Installation for Field Experiment in Jefferson County, Oklahoma," R. L. Koch, J. F. Gleason, Jr., and W. G. Boston, Magnolia Petroleum Co., Dallas; "Wind-Induced Vibration of a Pipeline Suspension Bridge and Its Cure," Raymond C. Baird, Fluor Corp., Los Angeles; "A Damper for Wind-Induced Bridge Vibration—Experimental Studies," Baird and Alvin J. Ebersole, Fluor Corp., Los Angeles; "The Use of Electronic Digital Computers in Pipeline Design and Operation," T. Y. Hicks, International Business Machine Corp., Houston, and C. V. Rohleder, Service Pipe Line Co., Tulsa.

Afternoon—"Economics of Design of Heat Exchangers," E. D. Anderson, Western Supply Co., Tulsa; "Design Problems and Applications of High-Speed Turbines," H. Steen-Johnson, Elliott Co., Jeanette, Pa.; "Pressure Weld Technique for Stub Ending Drill Collars," John L. Dickmann, Baash-Ross Tool Co., Los Angeles; "Electric Arc Technique for Stub Ending Drill Collars," W. S. Bachman, Drilco Oil Tools, Inc., Midland, Tex.; "Oil and Gas Transmission Lines, Application of Code for Pressure Piping," moderator, F. A. Hough, Southern Counties Gas Co., Los Angeles.

Evening — "Gas Turbine Applications," E. G. Naylor, General Electric Co., Schenectady, N. Y.

September 28

Morning — "Field Coordinating Organization for Improving Efficiency of Petroleum Refinery Maintenance," E. C. Hermann, Esso Standard Oil Co., Bayway, N. J.; "Field Welding of Heavy Wall Vessels," F. A. Upson, Standard Oil Co. (Ind.), Whiting, Ind.; "Techniques Developed in Testing Reinforced Polyester Pipe," H. D. Boggs and D. R. Longenecker, Fibercast Corp., Sand Springs, Okla.; "Resistance of Tubing Materials to Sulfide Corrosion Cracking," J. P. Fraser and R. S. Treseder, Shell Development Co., Emeryville, Calif.; "The Influence of High-Strength Materials on the Design and Fabrication of Multi-Layer Vessels," G. E. Fratcher, A. O. Smith Corp., Milwaukee; "Report on the Protection of Offshore Steel Structures by Metallurgical Methods," R. B. Morton, International Nickel Co., N. Y.; "Adapting Radiography to Petroleum Industry Needs," Harold Hovland, Industrial X-Ray Engineers, Seattle.

Afternoon—"The American Standard Code for Pressure Piping," F. S. G. Williams, Taylor Forge & Pipe Works, New York; "The Design of Offshore Drilling Structures," Richard J. Howe, Shell Oil Co., Houston; "Pressure Surges While Running Pipe," E. H. Clark, Jr., Baker Oil Tools, Inc., Los Angeles; "The Development of a Rubber Sealed Valve for Oil-Well Drilling," L. H. Carr, Edward Valves, Inc., East Chicago, Ind.; "Handling Viscous Crude Oils by Pipeline," Morgan Martin, Gulf Refining Co., Houston; "Economics and Operation Procedure of Crude-Oil Tank Mixers," Neil G. Wilson, Shell Pipe Line Corp., Houston.

September 29

Morning—"Allowable Membrane Stresses for Welded Carbon Steel Boiler and Pressure Vessels," W. P. Kerkhof, Asiatic Petroleum Corp., New York; "Stresses From Local Loadings in Cylindrical Pressure Vessels," E. P. Bijlaard, Cornell University, Ithaca, N. Y.; "Space Supports—The Circular Pedestal," N. A. Weil and J. J. Murphy, M. W. Kellogg Co., New York; "Principles of Duplex Slush Pump Operation," R. L. Walker, Denver, and R. A. Tappmeyer, Houston, both of Shell Oil Co.; "The Application of V-Belt Drives to Slush Pumps," W. S. Worley, Gates Rubber Co., Denver; "The Use of Metallic and Nonmetallic Linings for Pressure Vessels in Refinery Service," S. J. Artese, Shell Oil Co., Wilmington, Calif.; "Glass Coating as a Corrosion Barrier," W. A. Deringer, A. O. Smith Corp., Milwaukee; "Hydrogen Blisters in Transmission Line and Preventive Measures," Flipe Parades and W. W. Mize, El Paso Natural Gas Co., El Paso.

Afternoon—"A Look Ahead in Pressure Vessel Design," E. W. Jacobson, Gulf Research & Development Co., Pittsburgh; "Vapor Conservation Measures for Low-Pressure Producing Equipment," Walter E. Huffman, Black, Sivalls & Bryson, Inc., Oklahoma City; "Power Actuation of Flow Valves for Automation of Lease Operations," Alexander A. Toben, Ledeen Manufacturing Co., Los Angeles; "The Free Piston Gas Turbine Prime Mover," R. P. Ramsey, Cooper-Bessemer Corp., Mount Vernon, Ohio; "Automatic Control Systems: Electronic, Hydraulic, and Pneumatic," Roger Gilliand, Swartwout Co., Alhambra, Calif.

Refinery Visit Planned

LOS ANGELES.—Members of the California Natural Gasoline Association will inspect Richfield Oil Corp.'s new refining facilities near here during their twenty-ninth annual fall meeting October 7-8.

Papers will be presented on plant design, laboratory techniques, wet-gas gathering systems, and problems in gas engines and compressors. E. W. Walker will be general chairman of the meeting, which will be held at the Ambassador Hotel here.

Basin Test Promising

Continental well in zone which blew out 1 Bell Lake

HOBBS.—Continental Oil Co.'s second test to find a high potential pay zone in the Delaware basin portion of southern Lea County, New Mexico, may build as big a fire under future drilling and exploration, as was actually encountered in its first well.

The Delaware basin, a portion of which lies in southeastern New Mexico, is regarded by some geologists as one of the remaining basins for new oil frontiers in Texas and Southeast New Mexico.

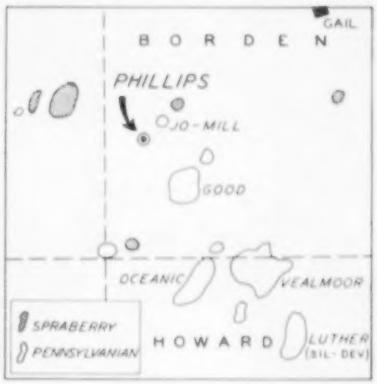
Continental 2 Bell Lake Unit, 1 mile north of the first well, apparently drilled into the same pay zone which blew out at No. 1. The well appears to be about 40 ft. low on structure, correlated with 1 Bell Lake.

Operators on 2 Bell Lake reported a drilling break at 12,495 ft., and started circulating for samples. First drill-stem test, thought to be lower in Wolfcamp, was run between 12,617-12,657 ft. Gas and distillate reached the surface in 14 minutes, and gas volume was gaged at 10,000,000 cu. ft. daily. Distillate yield was at the rate of 10 bbl. an hour. Flowing pressure reached 6,375 psi. This high rate of flow was made before acid treatments.

Blowout . . . Continental 1 Bell Lake Unit apparently had drilled 8 ft. into the pay section at 12,616 ft., when it blew out and burned in May. The test had to be abandoned after a second blowout and fire, and the firm started work on a twin well, and the 1-mile north offset.

The original well, the only deep test which has indicated good commercial production, renewed interest in the Delaware basin. Gas volume during the time of its blowoff was estimated unofficially at 100,000,000 cu. ft. daily. Previous to this well, good oil shows and small gas blows had been found in the lower Permian or upper Pennsylvanian at a number of southeastern New Mexico deep holes in the basin, but these were later plugged back to make fair discoveries in the shallower Delaware Mountain group.

Much interest hangs on the successful completion of Continental's second discovery, and known geology of the basin will be considerably strengthened. Areal limits of the basin stand to be corrected through drilling of these wells. Undoubtedly the present limits will be moved far northward to bring Continental's tests well within the basin instead of being on the extreme edge as was supposed.



New Spraberry Pool

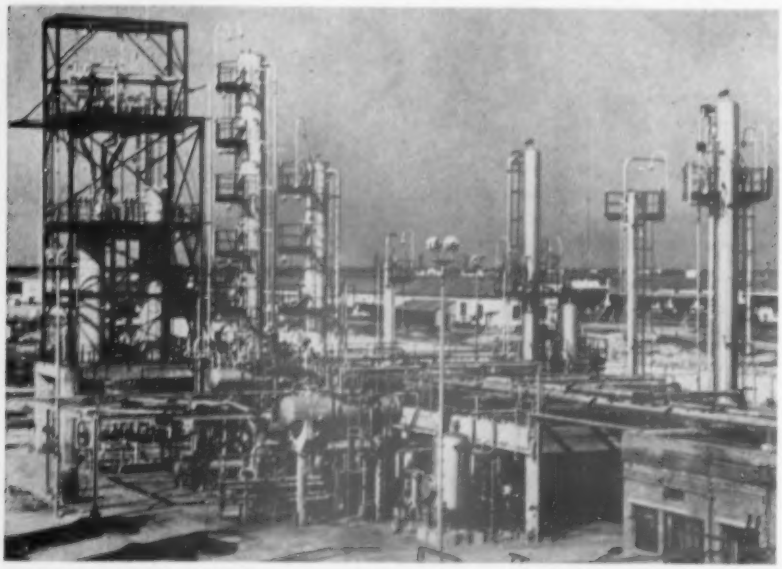
Phillips West Texas well tests 864 bbl. of 35° oil

SNYDER, Tex.—Phillips Petroleum Co. 1 Quartz has opened a flush new lower Spraberry pool in southwestern Borden County, West Texas. Initial potential through ¼-in. tubing choke was 864 bbl. of 35° oil, from 72 ft. of perforations between 7,200-7,346 ft. Gas-oil ratio was 652:1.

Location of 1 Quartz in Section 15, Block 33, Township 4 North, T&P Survey, is in an area where exploration this year has netted two Spraberry, one Wolfcamp and one Pennsylvanian discovery. Nearest Spraberry oil is to the northeast in Jo-Mill pool, discovered by J. E. Jones 2 Miller. Potential was 348 bbl. through ⅜-in. choke from pay topped at 7,095 ft.

Plans for Permian Basin Oil Show Reviewed

Officials of the Permian Basin Oil Show go over details of the 4-day show that will be held October 14-17 in Odessa, Tex. Seated are Lloyd French, left, immediate past president and president of French Tool & Supply Co., Odessa, and W. D. Lane, president of the board and an independent operator from Midland. Joe T. Dickerson, standing, left, vice president of the board and president of Shell Pipe Line Corp., looks on with Carlos Clover, secretary-manager of the show. More than 400 exhibitors are expected at the show, which previously was held in 1950 and 1952. The first stages of this year's event will be held in a "Boom Town" section that is scheduled to become part of a permanent museum.



THIS CATALYTIC-POLYMERIZATION unit is one of several major installations added to the Porto Marghera refinery.

Bombed Refinery Now Among . . .

. . . Italy's Most Modern

A JOINTLY-OWNED refinery at Porto Marghera (Venice) has bounced back from World War II bombings that virtually destroyed it to become one of the country's most modern refineries.

The Venice refinery is owned 51 per cent by the Italian Government and 49 per cent by Anglo-Iranian Oil Co., Ltd.

The plant was constructed in 1919 for processing residue for asphalt production. Ten years later the first of several expansions was made when a heavy-oil cracking and batch-redistillation unit was erected. The first major installations were set up in the early thirties, when two U.O.P./Dubbs crackers were constructed along with a McKee redistillation unit. In 1935, an oil dock and the first Foster Wheeler crude distillation plant were erected.

Postwar buildup . . . The refinery was heavily bombed and largely destroyed in 1944 by Allied air forces. It did duty as a bulk storage depot under the Allied military occupation from May 1945 until July 1946, when a limited amount of reconstruction was done. The Foster Wheeler distillation plant and a cracker were rehabilitated and recommissioned, followed by the second U.O.P./Dubbs cracker.

A new company, Industria Raffinazione Oli Minerali (IROM), was formed jointly by Azienda Generale Italiana Petroli (AGIP) and Anglo-Iranian, to enlarge and modernize the refinery. An Economic Cooperation Administration loan of $1,800,000 was obtained and a contract placed with Foster Wheeler Corp. for a 12,000-bbl. daily combination atmospheric and vacuum distillation unit.

At the same time, a sterling loan was obtained from the Italian Government financial agency to cover purchase in Britain of a considerable proportion of the material and equipment needed for the project. The material for the refinery was 60 per cent British, 30 per cent American, and the balance Italian.

The crude throughput of the refinery was stepped up from its nominal capacity of about 8,000 bbl. daily to about 30,000 bbl. daily.

Present plant . . . The refinery now consists of the existing Foster Wheeler topping unit, a new Foster Wheeler combination unit (12,000 bbl. daily, the vacuum section having 5,600 bbl. daily capacity), a stabilization plant for primary flash distillate, an existing coking plant (1,200 bbl. daily), a new thermal reformer (6,000 bbl. daily), a new catalytic-polymerization unit (1,300-1,400 bbl. daily charge capacity), acid and plumbite treating plants, and an industrial lubricants unit.

The refinery has a power system that is somewhat unusual. Most of the power comes from an existing distribution unit, but insofar as essential loads are concerned, it is generated inside the refinery by diesel driven generators. Electricity is generated in the refinery by two 1,000-kw, 50-cycle generators, two 215-kw, 50-cycle generators, and one 110-kw, 50-cycle generator.

Pemex Strike Made

Annual report says well Mexico's best since '38

THE Mexican Government oil monopoly, Petroleos Mexicanos, has further extended the old Golden Lane trend with an apparent major field discovery at Tecolutla.

The well, Miguel Hidalgo 1, tested at a rate of around 3,000 bbl. daily of 31° gravity crude oil. It is located a half mile back from the coast and about 30 miles southeast of Poza Rica field.

Antonio J. Bermudez, director general of Pemex, described the Miguel Hidalgo discovery as the most important to be made in Mexico since the expropriation of foreign oil properties in 1938.

This region east of Poza Rica and southeast of the Golden Lane has been the scene of Pemex's most successful exploration. In June 1952, Pemex made an important discovery in its Ezequiel Ordonez well 13 miles east of Poza Rica *(The Oil and Gas Journal, September 15, 1952, page 76)*. The pay in this reef trend is a Cretaceous limestone.

Announcement of the Miguel Hidalgo discovery was a highlight of the annual State of the Nation report to the Congress by President Adolfo Ruiz Cortines.

Report review . . . The Mexican president said that production during the first 8 months of the year averaged 253,000 bbl. daily as compared with 217,000 bbl. daily in 1953. Petroleum reserves, he said, now amount to 2,427,000,000 bbl. against 2,261,000,000 bbl. last year and 1,058,000,000 in 1946. Petroleum exports amount to 70,000 bbl. daily. (These figures include the crude-oil equivalent of natural gas reserves; production figures also apparently include an unspecified amount of distillate).

Mexican refining capacity, the president reported, has increased to 272,000 bbl. daily. At Salamanca in the State

Southwest

PACKAGED COMPRESSOR PLANTS

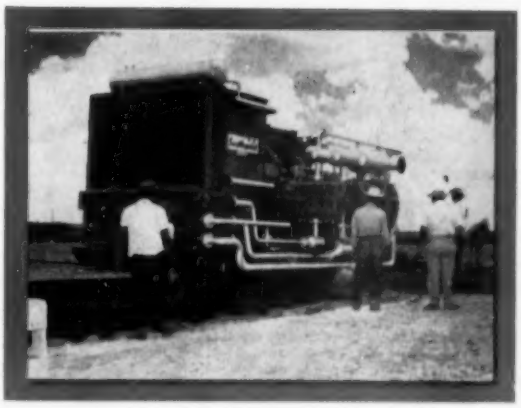
Cooper-Bessemer

GMX V-ANGLE GAS ENGINE-DRIVEN COMPRESSOR

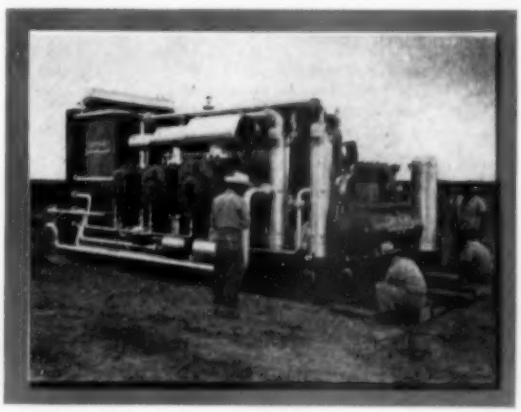
COMPLETELY PORTABLE

READY TO GO

SOUTHWEST Packaged Gas Engine-Driven Compressor plants are complete, portable units. Code constructed and fully factory assembled, they are mounted on portable, heavy-duty skid bases with cooling, air starting, lubricating, scrubbing, and automatic control systems installed and ready for unattended field operation.



Every SOUTHWEST plant is individually engineered for present needs and simple conversion to future requirements. The heart of the packaged unit is the compact, Cooper-Bessemer GMX, V-angle gas engine-driven compressor unit, available in sizes to 500 horsepower. Wind direction has no effect on the performance of the specially designed vertical air discharge cooling system. Efficient operation of the cooling unit saves horsepower to be applied to compression of more gas.



SOUTHWEST INDUSTRIES, INC.

FOR GAS LIFT, GAS BOOSTER, PRESSURE MAINTENANCE AND SIMILAR PROJECTS

Post Office Box 7773 Houston 7, Texas

of Guanajuato, a new lubricating-oil plant now being completed will eliminate the country's present heavy bill for imports of this high-cost product. The Pemex program includes the construction in the near future of at least two nitrogen fertilizer plants at a cost of about $32,000,000.

As an indication of the importance of the industry to the country's economy, President Ruiz pointed out that last year Pemex paid the government in taxes and other revenue the equivalent of about $45,500,000 and at the same time made the highest investment in its history in pipelines, refinery improvements, and other permanent installations. This year, Pemex will pay the government more than $50,000,000 and simultaneously finance a construction and development program larger than that of any other country other than the United States, he said.

Iraq Line Finished

New 132-mile, 12-in. line to serve Baghdad refinery

COMPLETION of a new 132-mile, 12-in. pipeline has connected the Iraq Government's Baghdad refinery with the main Kirkuk-Eastern Mediterranean system of Iraq Petroleum Co., Ltd.

The line extends from Station K-2 (Baiji) near the Tigris River to the refinery at Dora on the outskirts of Baghdad. The new 25,000-bbl. daily plant is being built for the government by M. W. Kellogg Co. and is due to come on stream the middle of 1955.

The pipeline was laid by Basrah Petroleum Co., Ltd. (associated with Iraq Petroleum) on behalf of the Iraq Government. Construction was started last December, but work was held up by the heavy floods last March in the Baghdad area.

From Station K-2 on the Kirkuk-Banias and Tripoli system, the new line runs south through open desert for about 90 miles. It then extends through irrigated country and continues between the new Baghdad-Mosul road and the Baghdad-Baiji railroad. The pipe crosses irrigation canals on 30-in. pipe flumes or culverts.

The new Baghdad refinery is designed to meet most of Iraq's internal requirements for petroleum products. Under the 1951 concession revision providing a 50-50 profit sharing between I.P.C. and the government, the company is obligated to supply crude for the refinery at a token price of slightly more than 10 cents a barrel with the government paying the annual Baiji-Baghdad pumping costs.

Parentis Field Grows

Third confirmation well nearing French pay zone

ESSO STANDARD, S.A.F., is nearing the pay zone in the third confirmatory well drilled in its new French field at Parentis, 44 miles southwest of Bordeaux.

The well, 4 Parentis, which is on the north side of the lake about 4,000 ft. north of the discovery, is drilling below 5,250 ft. It is testing the north flank of the east-west anticlinal structure.

The No. 3 well to the west was taken to salt water at 8,040 ft. and is being plugged back. Tests gave a recovery of nearly 2,000 bbl. daily, about the same as the discovery *(The Oil and Gas Journal, August 30, page 63)*. On the south, running considerably lower, 2 Parentis showed some salt water but tests have not been completed.

The company recently spudded in another wildcat on its southwestern France concession. This well is located at Carcans about 31 miles northeast of Bordeaux.

If the present promise of Parentis is realized, the area will soon become the largest producing field in Western Europe. The discovery of large-scale, good-gravity crude in thick limestone section will be of great value to the French economy and is already stimulating further activity in this as well as the other sedimentary basins of metropolitan France.

The tabulation below lists the major characteristics of the crude from the Parentis discovery:

Gravity, A.P.I.	32.46
Sulfur per cent weight	0.39
R.v.p., psig.	5.3
PP, °F.	+43
Flash Cleveland, °F.	<75
S.U.v. at 70° F.	58.23
Water and sediments by centrifugation, per cent	1.2
Salts as sodium chloride:	
(LIC 28-001) G/m.³	31
Lb./bbl.	0.011
I.b.p., °F.	131
10 per cent	226
30 per cent	405
40 per cent	527
50 per cent	610
60 per cent	678
Yields from assay distillation:	
Gas (C_2 and C_3), volume per cent	0.55

Shell Gets Show in Nigeria

Another oil show has been obtained by Shell D'Arcy Petroleum Development Co. of Nigeria, Ltd. The company said preliminary results are encouraging and further testing is under way. The well is at Ituk Mbang in Calabar Province in the eastern part of Nigeria.

Brazil's Airlift Cat Cracker Building

The airlift T.C.C. unit at the new Capuava refinery in Brazil, shown here in scale model, will be the world's largest plant of this design. It will have a reactor charge capacity of more than 25,000 bbl. daily and will be the first moving-bed catalytic cracking unit in South America. The Capuava refinery of Refinaria e Exploracao de Petroleo Unias, S.A., a private Brazilian company, is being built near Sao Paulo (The Oil and Gas Journal, April 12, page 108). Hydrocarbon Research, Inc., provided the basic design for the Capuava unit.

German Discovery

Promising Bavarian wildcat may open new oil province

A promising oil discovery which may open up an entirely new oil province in Western Germany has been made in the Ampfing 4 well in the Bavarian foothills of the Alps about 40 miles east of Munich.

Discovery was drilled by Deutsche Vacuum Oel AG-Bayerische Mineral-Industrie in a joint-interest operation with Gewerkschaft Elwerath and Preussag. (Deutsche Vacuum is an affiliate of Socony-Vacuum Oil Co., Inc.) The test, located about 7,500 ft. west of Ampfing 3, found the oil-bearing base sand of the Tertiary at 5,900 ft. and produced about 60 tons daily (407 bbl.) on tests through a ¼-in. choke and 10-15 tons (68 to 100 bbl.) on ⅛-in. choke. Gravity was 0.930 or 20.5° A.P.I.

Offset wells which have already been located will show the extent and commercial importance of the discovery. Earlier this year the same group discovered natural gas in the wells, Ampfing 2 and 3, in what now appears to be the gas cap of the deep oil formation.

The new production is the first to be found in the large Molasse Basin, aside from an old, small field at Rogatsboden near Tegernsee which has an annual output of only 75 to 100 bbl. The Molasse Basin extends over parts of Bavaria, Switzerland, Austria, and Czechoslovakia and has been the scene of unsuccessful oil exploration for many years.

Product Lines To Serve Kwinana

A PRODUCTS pipeline system connecting the new Kwinana refinery in Western Australia with the nearby port of Fremantle is scheduled to be completed early next year.

One line, 12 in. in diameter and 15 miles long, will move fuel oil to ships' bunkering installations at Fremantle harbor. The other 6-in., 17-mile line will carry light products to a terminal for distribution throughout Western Australia.

The 12-in. black oil line is designed so that heat lost to the ground from the lighter black products, pumped hot from the refinery, will be used to reduce the heat loss of the heavier oils to follow. This line has two duplex double-acting ram pumps, steam driven, and will move about 7,000 bbl. daily.

Motor-driven centrifugal pumps will be connected to the white-oil line, designed to move 11,000 bbl. daily. The two lines will be laid side by side. Where space is limited, they are being laid in a common trench. Contractors for the trench ran into some difficult ditching. One ¾-mile section had to be cut 12 ft. deep through solid limestone.

A pipe-bending machine was built on the site, and a cargo winch is used to pull the pipe to the required angle.

The pipeline work is being carried out by Australasian Petroleum Refinery, Ltd., the subsidiary of Anglo-Iranian Oil Co., Ltd., which is building the 60,000 bbl. (calendar) daily capacity Kwinana refinery. The refinery itself is due to be brought into operation early in 1955.

Pakistan Line Planned

A 60-mile natural gas pipeline from Dhulian field to Rawalpindi in West Pakistan is planned by Attock Oil Co.

The project has been authorized by the company's board subject to the granting of import license and the necessary exchange by the Pakistan Government.

Dry gas above the company's field requirements has become available as a result of increased oil production from a deep zone in Dhulian field, one of four which the company operates in the Potwar basin and southwest of Rawalpindi. The surplus gas can be absorbed economically as fuel at the 4,800 bbl. daily Attock Oil refinery at Rawalpindi and by other users of power at Rawalpindi.

Turkish Stock For Sale

The Turkish Government oil company which will operate the country's two existing fields will have a capital of 150 million Turkish pounds ($53,500,000) of which 49 per cent will be sold to the public.

The new company is the largest ever to be financed with Turkish capital. So far, Turkish banks have taken about $18,500,000 of the minority public stock, leaving about $7,800,000 to be sold.

The government company is the Turkiye Petrolleri Anonim Ortakligi. It was authorized by legislation approved early this year at the same time the Parliament passed a new petroleum law opening up the country to foreign oil capital. To encourage investment in the new company, the shares held by the public carry a guaranteed 6 per cent interest, and, in addition, extra interest will be payable during the first 5 years.

Turkish officials have said the new company will be confined to the two existing fields, Garzan and Ramandag, and another possible area now being drilled, Resandag.

Yemen Reports Denied

Reports of the discovery of oil shows in Yemen have been denied by authoritative German sources.

An exploration program in the Red Sea kingdom is being carried out under a contract with the government by the German company, Carl Deilmann Bergbau, G.m.b.H., but up to now only geological and gravimetric work has been undertaken. This is continuing under what is described as rather difficult local conditions. No deep drilling rig has as yet been shipped to the area.

Oil Off Russia's Shores . . .

RUSSIA is pushing her offshore development.

A recent photo, above, supplied by Sovfoto, shows Russian development of an offshore field in the Caspian Sea. The field is called Neftyanye Kemny (Oil Rocks), and is about 60 miles off the coast. Development started in 1949 and is continuing on a round-the-clock basis as the producing area is constantly enlarged.

Supplies are brought in by ship, and transportation between individual installations is by trestle, some 25 miles of which have been built. A community of two-story pile-supported houses have been built and an out-patient hospital opened. A Palace of Culture is under construction.

Last year the Soviets reported that 15 per cent of their crude output came from offshore fields. On the basis of this percentage, Russia is now producing about 175,000 bbl. daily from such fields which are principally in the Caspian.

Total Russian oil production is expected to average about 1,165,000 bbl. daily in 1954. This figure is based on the recently announced percentage increase over the known 1953 output of around 1,040,000 bbl.

International Briefs

Assets and properties of Standard-Vacuum Oil Co. on the Chinese mainland have been turned over to the Soviet-owned Kwong Hwa Petroleum Co. by the Communist Chinese Government, according to a report from Hong Kong. The properties of the company and also those of Caltex, consisting of distribution and transportation facilities, were seized by the Communists shortly after they completed their conquest of the mainland in 1949.

Heavy floods sweeping down the Brahmauptra River in Northeast India have inundated facilities at the newly discovered Nahorkaliya field in Assam. The floods, blamed on heavy rains in the Himalayas, were the worst ever experienced in the region. Assam Oil Co., Ltd. (Burmah Oil Co., Ltd.), has completed three wells and was drilling a fourth in the field.

Union Oil Co. of California representatives are reported to be negotiating for exploratory rights in Guatemala where the Communist-dominated government was ousted a few months ago. Richard Harris, Union's foreign manager, discussed possible operations in the Peter and Izabal areas with the Guatemalan minister of communications, Prado Velez, and prepared a proposal for submission to the new junta government.

Arabian American Oil Co. is about to complete a difficult fishing job in its Rub-al-Khali wildcat approximately 200 miles south of Uthamniyah in the great southeastern desert of Saudi Arabia. The well reached 10,360 ft. before the tools were stuck the middle of June.

A new asphalt plant has been completed at Anglo-Iranian Oil Co., Ltd.'s BP refinery in Hamburg, Germany. The plant has a capacity of 50,000 tons a year (about 830 bbl. daily), charging residue from the vacuum unit commissioned earlier this year.

Iraq Petroleum Co., Ltd., still has under discussion with the Jordan Government the matter of the surrender of its exploratory concession in that country. An I.P.C. official in London said reports from Amman that the company has agreed to cancellation of its concession were incorrect. "We have indicated our willingness to surrender provided an agreement can be reached, but none has been reached so far," he said.

Douglas Oil Co. has spudded another exploratory test at its Pacifico concession in Northwest Peru. The well, one of several planned to extend production offshore, was drilling below 1,500 ft. toward an objective of about 4,000 ft. The beach-situated test is northeast of deeper wells the company drilled earlier this year.

The Shell organization has started construction of a Platformer at its Shell Haven refinery on the north bank of the Thames Estuary in England. The unit, costing the equivalent of about $7,000,000, will have a capacity to produce some 240,000 tons annually (about 5,800 bbl. daily) of high-octane components when it comes into operation the latter part of next year. The Shell Haven refinery has a crude capacity of 66,600 bbl. daily and 9,200 bbl. daily in thermal reforming.

Latest wildcat in the increasing exploration in Sicily has been undertaken by a Gulf subsidiary about ¾ mile northeast of the village of Joppolo near the town of Aragona in the southwestern part of the island. American International Fuel & Petroleum Co. is drilling the test on the Aragona-Licata permit area of Mediterranean Oil Co. (65 per cent Gulf and 35 per cent Macmillan Petroleum Corp.). American International is due to begin another deep test in September on Mediterranean Oil's Comiso permit.

Three exploration licenses for work in the British islands of Malta and Gozo have been granted to D'Arcy Exploration Co., Ltd. (Anglo-Iranian Oil Co., Ltd.) by the Government of Malta. Malta, 58 miles south of Sicily, has an area of 95 sq. miles. Neighboring Gozo covers 26 sq. miles.

another page from Tuboscope Research

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LEADER IN NON-DESTRUCTIVE TESTING IN THE PETROLEUM INDUSTRY

Have you been overlooking production?

Here's a New Method of Interpreting Electric Logs in Shaly Sands

by William E. White

By extending basic knowledge of shaly sands, the author has evolved a method by which the field user of electric logs can interpret production possibilities of shaly sands with a much higher degree of accuracy. Possible result: realization of more production in sands that heretofore were believed uneconomic.

QUANTITATIVE interpretations of electric logs, in terms of per cent porosity and water saturation, are reasonably accurate for clean sands or carbonates, but is only a very rough estimate for "dirty" or shaly sands.

Recent work on the subject of these shaly sands has produced a great deal of the basic knowledge needed for proper quantitative analysis, and one group has arrived at some usable quantitative formulas for the special case of laminated sands and shales. Although a great deal of work has been done on the more general case of sands containing shaly material, to date there does not exist a method by which the field user of electric logs can arrive at a reasonable quantitative interpretation of such sands.

It is the purpose of this article to utilize the basic knowledge of shaly sands as developed by others, particularly Perkins, Brannon, and Winsauer, and to extend it to the point where it may be more easily used for a quantitative analysis of the more general cases of disseminated shaly sands as well as clean sands. To accomplish this purpose a slightly different concept of the relationships of porosity, water saturation and resistivity must be developed.

Author is division manager for electrical wel services, Halliburton Oil Well Cementing Co., Houston.

Porosity—Resistivity—Saturation

The now generally accepted porosity-resistivity relationship for clean sands is:

$$R_o/R_w = F = .62/P^{2.15} \qquad (1)$$

Although this formula was derived empirically, it seems to have withstood the test of time and many crosschecks with core data. Therefore, we may presume that this is a reasonably accurate formula for clean sands.

Ideal case . . . For the moment, consider only the case of the ideal, clean, water-saturated sand containing no shale or other so-called "conductive solids." In this case the sand particles are, for all practical purposes, nonconductive and the only conductive medium in the sand is the interstitial water in the interconnected pores. Since only the water can conduct an electric current and thus produce a resistivity reading, the ratio of R_o/R_w is a reasonable measure of the amount of water per unit volume of sand in a water-saturated sand. Accordingly, the above equation may be rewritten as:

$$R_o/R_w = F = .62/W^{2.15} \qquad (2)$$

where W is defined as the per cent water per unit volume of sand.

If some of the interstitial water in this clean sand were to be replaced by smaller grains of sand, or by some cementing material being placed in the

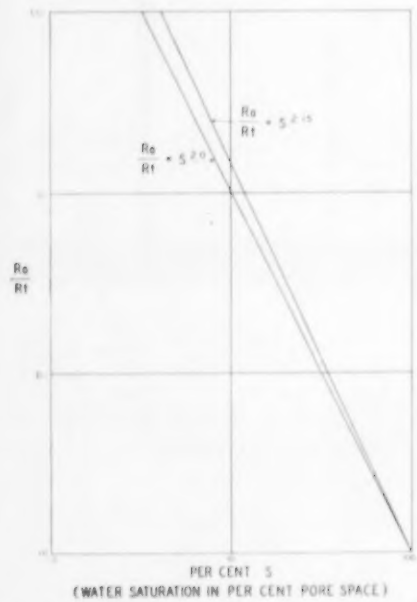

Fig. 1—Graphical comparison of Equations 6 and 7 shows a reasonable agreement with less than 3 per cent difference in values of the water saturation.

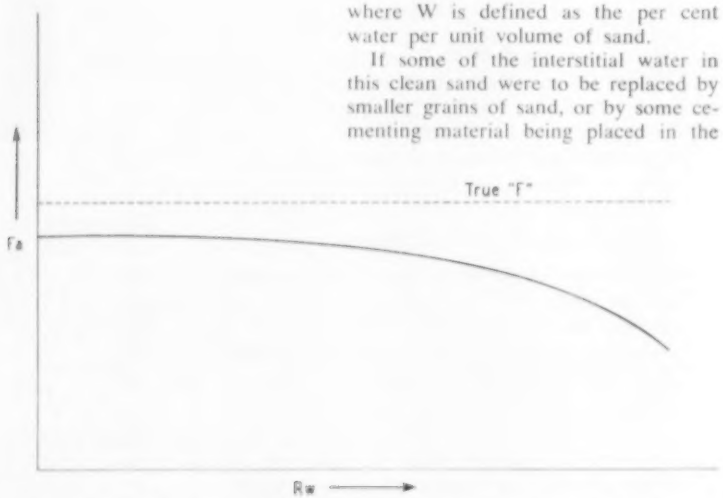

Fig. 2—The value of the apparent formation factor, Fa, in a shaly sand is a function of the resistivity of the saturating water, Rw.

pore spaces, the water would still be the only conductive medium. The exact distribution of this water, and hence the electrical tortuosity, would be subject to many variations due to grain size, packing, the form, and the amount of the cementing material. However, it is generally accepted that these factors tend to average out and that Equations 1 and 2 would still give a reasonably good measure of the porosity or per cent water per unit volume in the sand.

Water distribution important . . . Should a hydrocarbon—also nonconductive—replace some of the water in this sand, considerable water would remain behind both as free, interstitial water, and as a thin film of bound water around each grain of sand. The water would still be the only conductive medium present. The oil or gas would become a part of the nonconductive system together with the sand and cementing material.

The distribution of the water in this system would be dependent on the sand conditions as above and the amount of hydrocarbons present. The amount of hydrocarbons would not change the distribution any differently than would the amount of smaller sand grains.

In addition, the distribution could be changed in a way not encountered in water-saturated sands, by the forces of gravity, capillary action, interfacial tension, and perhaps other static reservoir forces.

Typical reservoir conditions . . . However, it is empirically submitted that under the conditions found in the usual water-wet reservoir with commercial porosity and permeability, the effect of these additional forces would be of a minor secondary nature compared to the effect of the other conditions mentioned above. At any rate, the results obtained from this assumption are well within the limits of measurable accuracy as will be later shown.

Accordingly, the per cent water per unit volume of sand can still be reasonably estimated by Equation 2 when the nomenclature is made to conform with accepted usage for the special case of clean sand containing hydrocarbons. The equation would then be rewritten as:

$$R_t/R_w = U = .62/W^{2.15} \qquad (3)$$

U is merely the ratio R_t/R_w and is related to the per cent water as shown.

Should Equation 2 be divided by Equation 3:

$$\frac{R_o/R_w}{R_t/R_w} = \frac{F}{U} = \frac{.62/P^{2.15}}{.62/W^{2.15}}$$

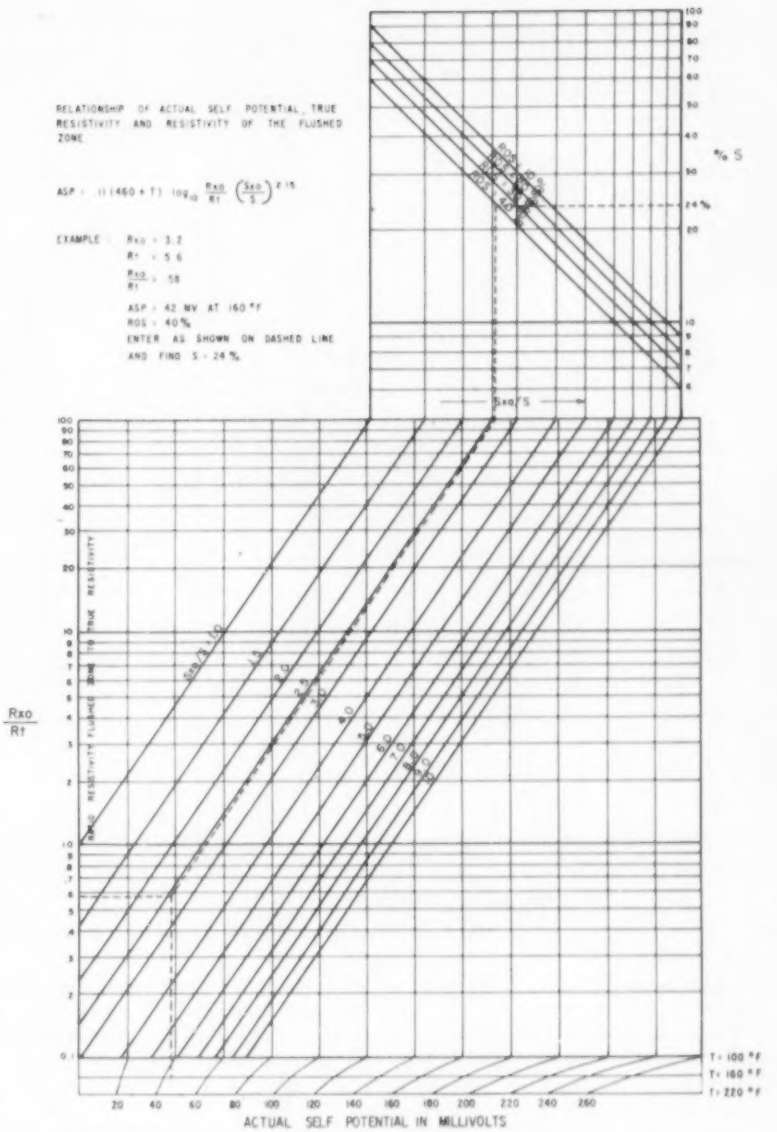
RELATIONSHIP OF ACTUAL SELF POTENTIAL, TRUE RESISTIVITY AND RESISTIVITY OF THE FLUSHED ZONE
ASP = (1460 + T) log10 Rxo/Rt (Rxo/S)^2.15
EXAMPLE
Rxo = 3.2
Rt = 5.6
Rxo/Rt = .58
ASP = 42 MV AT 160 °F
ROS = 40%
ENTER AS SHOWN ON DASHED LINE
AND FIND S = 24 %
% S
Rxo/S = ∞
Rxo/Rt
RESISTIVITY FLUSHED ZONE
TRUE RESISTIVITY
T = 100 °F
T = 160 °F
T = 220 °F
ACTUAL SELF POTENTIAL IN MILLIVOLTS

Fig. 3—Nomograph provides an easier application of Equation 15. It can be used for evaluating either clean or shaly sands, with or without hydrocarbons.

This results in:

$$R_o/R_t = F/U = (W/P)^{2.15} \qquad (4)$$

Since S is defined as the per cent water in the pore space of a hydrocarbon bearing sand, then:

$$S = W/P \qquad (5)$$

and Equation 4 may be written as:

$$R_o/R_t = F/U = S^{2.15} \qquad (6)$$

This is certainly comparable to the empirically derived Archie equation:

$$R_o/R_t = S^2 \qquad (7)$$

The significant difference in the two equations is that Equation 6 is derived from porosity and per cent water per unit volume considerations. To accept the exponent as being consistently 2.15 implies, of course, that of the two empirically derived equations, the one for porosity is more nearly correct. Fig. 1 is a graphical comparison of the two Equations 6 and 7. It is noteworthy that Equation 6 gives slightly more conservative figures for water saturation throughout, but both agree within a range of 3 percentage points or less for all ratios of R_o/R_t. This difference is certainly well within the range of measurable accuracy as mentioned above. It should be remembered that all porosity and saturation formulas are empirically derived and are intended only to give reasonable estimates. The

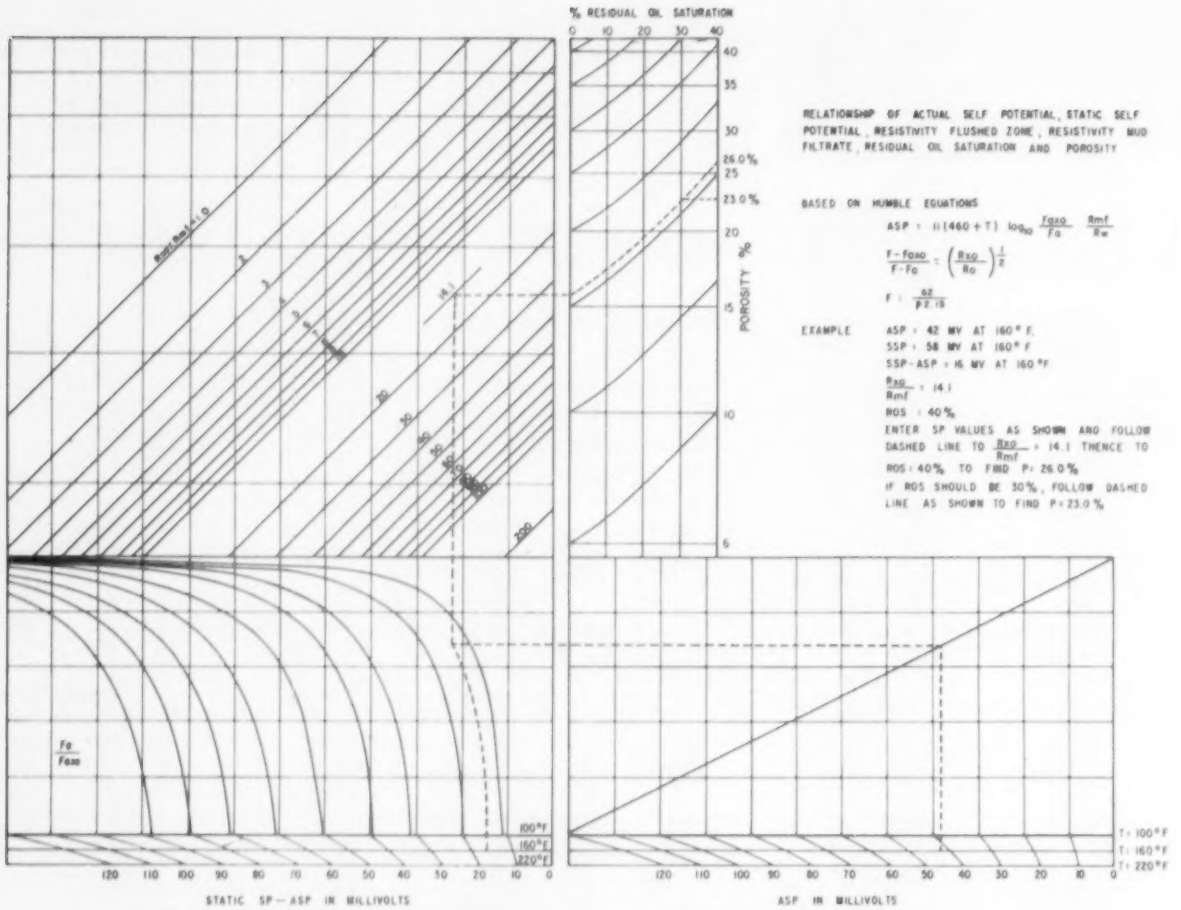
% RESIDUAL OIL SATURATION
POROSITY %
RELATIONSHIP OF ACTUAL SELF POTENTIAL, STATIC SELF POTENTIAL, RESISTIVITY FLUSHED ZONE, RESISTIVITY MUD FILTRATE, RESIDUAL OIL SATURATION AND POROSITY
BASED ON HUMBLE EQUATIONS
EXAMPLE
ASP = 42 MV AT 160° F.
SSP = 58 MV AT 160° F
SSP-ASP = 16 MV AT 160 °F
ROS = 40%
ENTER SP VALUES AS SHOWN AND FOLLOW DASHED LINE TO Rxo/Rmf = 14.1 THENCE TO ROS = 40% TO FIND P = 26.0%
IF ROS SHOULD BE 30%, FOLLOW DASHED LINE AS SHOWN TO FIND P = 23.0%
STATIC SP — ASP IN MILLIVOLTS
ASP IN MILLIVOLTS
T = 100°F
T = 160°F
T = 220°F

Fig. 4—This nomograph presents a rapid method for determining porosity.

equation proposed here is of such a type.

The above derivation of Equation 6 is the concept of resistivity and saturation needed to allow quantitative analysis of the shaly sands.

Saturation in Shaly Sands

In all of the work on shaly sands the concept of apparent formation factor, Fa, was developed. The actual value of Fa in a shaly sand is dependent on the resistivity of the saturating water (see Fig. 2) and it is generally defined as the ratio of the resistivity of the formation 100 per cent water saturated to the resistivity of the saturating fluid. So that in a sand containing shale or other colloidal material:

$$R_o/R_w = Fa \qquad (8)$$

Perkins et al. showed that where dispersed shale or other colloidal material is present Fa is:

$$Fa = R_o/R_w = F\,(\rho_i/R_w) \qquad (9)$$

where F is the "true" formation factor which is related to the porosity and ρ_i is the resistivity of the fluid in the pores resulting from the mixture of R_w and shaly material.

This equation may be combined with the porosity equation to give:

$$\frac{R_o}{R_w} = Fa = \frac{.62}{p^{2.15}}\,(\rho_i/R_w) \qquad (10)$$

This is similar to the usual porosity equation except that the presence of shaly materials has been accounted for with the ratio ρ_i/R_w.

Following the same line of reasoning as used in the case of clean sands, the shaly-sand equation for hydrocarbons may be developed as:

$$\frac{R_t}{R_w} = Ua = \frac{.62}{W^{2.15}}\,(\rho_i/R_w) \qquad (11)$$

and, as before, dividing the two equations results in:

$$R_o/R_t = S^{2.15} \qquad (12)$$

This equation states, in effect, that when water saturation is treated in the same manner as electrical porosity, the saturation may be reasonably estimated for a shaly sand by the same parameters, R_o and R_t, as used in estimating saturation in clean sands. This is true since the terms evaluating dispersed colloidals cancel out in the final form.

Following similar reasoning, it may be shown that in the flushed zone behind the mud cake, for clean or shaly sands:

$$R_{oxo}/R_{xo} = (S_{xo})^{2.15} \qquad (13)$$

where R_{oxo} is the flushed zone equivalent of R_o, and R_{xo} is the actual measured resistivity from a contact log.

Self-Potential and Saturation

Perkins, Brannon, and Winsauer developed the following relationship of SP and resistivities, good only in water-bearing sands—clean or shaly:

$$ASP = .11\,(460 + T) \times \text{Log}_{10}\frac{Faxo}{Fa} \times \frac{R_{mf}}{R_w} = .11\,(460 + T) \times \text{Log}_{10}\frac{R_{oxo}}{R_o} \qquad (14)$$

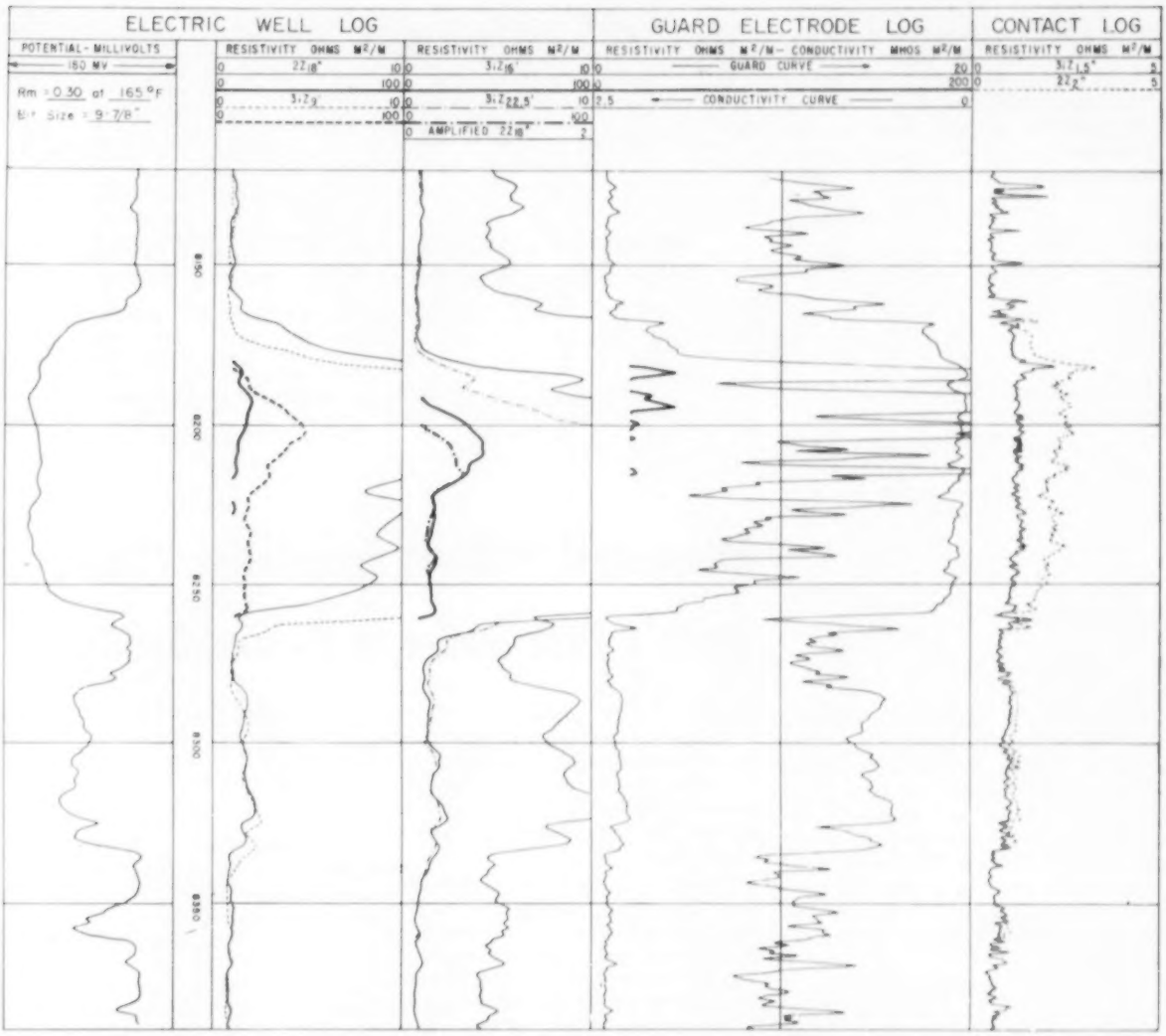

Fig. 5—Calculated porosities from this electric log through the Frio section compared very favorably with actual core data. Zones analyzed were from 8,166 to 8,210 ft. and from 8,276 to 8,333 ft.

When Equations 12 and 13 developed above are substituted into this equation there results an equation which evaluates the variables in clean or shaly sands, with or without hydrocarbons:

$$ASP = .11\ (460 + T) \times \text{Log}_{10} \frac{R_{xo}}{R_t} (S_{xo}/S)^{2.15} \quad (15)$$

T is the formation temperature in °F. ASP is referred to as the actual SP in the sense that no filtration or "streaming potentials" are present and bed-thickness effects are negligible. Where thickness effects are not negligible corrections must be applied. The form of this equation is in general agreement with the results of Wyllie and Southwick.

Fig. 3 presents Equation 15 in nomograph form for easier application.

Self-Potential and Porosity

In this same paper it was shown empirically that the "true" formation factor, F, was probably related to the other variables as:

$$(F - Faxo)/(F - Fa) = (R_{xo}/R_t)^{1/2} \quad (16)$$

where Faxo and Fa are the apparent formation factors in the flushed zone and in the undisturbed zone respectively and F is understood to be related to the true porosity **only.**

It was further shown that the difference in observed SP and the static SP (SSP) opposite a clean sand could be developed from Equation 14 to give the ratio of Faxo and Fa as:

$$SSP - ASP = .11\ (460 + T) \text{Log}_{10} \frac{Faxo}{Fa} \quad (17)$$

These two equations can be combined into nomograph (Fig. 4) form for simplicity with the porosity and saturation equations as proposed. The nomograph presents an easy method of estimating porosity.

Field Example

Fig. 5 is an FM electric log, guard log, and contact log from the Frio section in the Texas Gulf Coast. In this well extensive coring was done in oil-base mud in order to obtain accurate saturation and porosity figures. In order to have comparably detailed results from the logs, they were calculated foot by foot.

The quantities R_{xo} and R_{xo}/R_{mf} were determined from the contact log using the published contact log departure curves. R_t was determined from the guard log and the applicable departure curves, since only this log is capable

of recording the wide variations in resistivity which actually exist in all formations. (In absence of this type of log, an average R_t would be determined from the standard FM electric log.) The ASP values were read directly from the log. Below is a sample of the tabulated calculations used:

	From contact log					From guard log Di = ½ d				Calculated, assuming ROS = 40 per cent		
	Ra 1½	Ra2	R_{xo}		R_{xo}					R_{xo}		
Depth	R_{mc}	R_{mc}	R_{mc}	R_{xo}	R_{mf}	Ra	R_t	SSP	ASP	R_t	S	P
8,172	1.9	2.4	4.9	3.2	14.1	4.0	5.6	58	42	0.58	24	26.0

These calculations are shown on the two nomographs.

The averages of saturation and porosity were:

	Clean sand 8,166-8,210	Shaly sand 8,276-8,333
Calculated per cent water saturation	17	37
Core analysis per cent water saturation	17	44
Calculated per cent porosity	25	26
Core analysis per cent porosity	26	26

Although the concepts set forth here have been checked in only a limited number of cases, it is felt that due to their completeness they will apply equally well to clean or shaly sands. For the special case of laminated shaly sands, the results with these formulas are consistent with the results obtained using the formulas based on laminations. The method should, therefore, prove universally applicable.

Of particular interest at this time is their application to the Gulf Coast Cockfield-Yegua sands. Since these sands are of the disseminated shale type with very low resistivities, this type of analysis should be extremely helpful.

Acknowledgments

Appreciation is expressed to Sun Oil Co. for making available these logs and core data.

The writer wishes to express his gratitude to the members of the Halliburton Electrical Well Services research department for their many helpful suggestions in preparing this paper and nomographs. Appreciation is also expressed to the management of Halliburton Oil Well Cementing Co. for permission to publish this article.

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Mississippi Wildcat Completion Marks State's First Strike in Paluxy Sands

LARCO DRILLING CO. recently completed an important Paluxy wildcat in Hinds County, Mississippi, only 12 miles west of Jackson. Geologists consider that the well is the most important test completed in the state in many years.

Paluxy sands produce in Louisiana and East Texas, but this is the first commercial Paluxy well in Mississippi. The Bolton well logged 62 ft. of net oil sand in the Paluxy from three zones; in addition, 56 ft. of sand had shows of oil that could be commercial.

Offset wells will help to evaluate the structure; scout reports indicate that there is very little relief in the Upper Cretaceous beds. This does not mean much, however, because of the pronounced unconformity between these beds and the pay horizon.

Drilling of the discovery well offered few problems and the successful wildcat was completed in 39 days. Subsequent wells will be drilled in considerably less time as contractors become more familiar with the conditions in the field.

BOLTON FIELD, HINDS COUNTY, MISSISSIPPI, DISCOVERY WELL

Larco Drilling Co.
1 Lettie McAlpin
Section 19 6n-2w (350 ft. S. and 400 ft. W. of NW cor. NE SE)
Spud: 6-8-54
Total depth: 9,951 ft.
I.p. 274 bbl. oil per day, 8/64-in. choke, tubing pressure 1,050 lbs., G.O.R. 191:1
Gravity 35.4° A.P.I., 0.2 per cent b.s.
Pay zone: Perforated interval 9,920-40 ft. with 120 shots.

Normal Rig-Time Distribution

Days on footage rate	29
Days on day-work rate	10
Total days (spud to rig release)	39

Bit Data

Total number of bits	32
Foot per bit	312
Hours per bit	18

Equipment

Derrick	144-ft. mast
Draw works	Oilwell 96
Motors	3; 1,300 hp. total
Pumps	one 20-in. and one 14-in.
Fuel	Diesel
Water supply	Water well
Nearest supply center	Brookhaven, Miss.
Terrain and roads	Good

Casing Program

	O.D. (in.)	Casing Seat (ft.)	Cement (sacks)
Surface	13⅜	1,349	450
Oil string	5½	9,950	550

Mud Summary

Gel mud used to total depth.
Mud costs were approximately $5,000.

Geological Data

Depth (ft.)	
2,563	Wilcox
4,667	Gas rock
5,948	Base gas rock
6,090	Base chalk
6,455	First sand
7,712	Lower Tuscaloosa
7,960	Lower Cretaceous
8,844-68	Sand/show of oil
9,282-98	Sand/show of oil
9,623-42	Sand/show of oil
9,775-83	Sand/show of oil
9,816-36	Sand/show of oil
9,930-48	Sand/show of oil

How N.C.R.A. Operates Its Underground L.P.G. Storage

Double annulus permits washing out while products are in storage; stored L.P.G. acts as "blanket" to protect top of hole.

by G. H. Billue* and T. E. Roberts†

THREE underground storage wells for propane and butane have been operated by National Cooperative Refinery Association at McPherson, Kans. The wells are serviced by a 7-mile products line between the N.C.R.A. refinery and the storage site. N.C.R.A. plans to increase underground storage to include products other than L.P.G., including natural gasoline to be used for blending, off-season storage of burning oils, other finished products, and crude oil.

Washing out . . . This operation, for additional capacity, was conducted with continuing storage of butane and propane. Water circulation was stopped long enough to transfer the L.P.G. products to storage after which time washing circulation was started. After completing circulation on No. 1 well it was used for propane storage. The Nos. 2 and 3 storage wells were circulated with fresh water simultaneously by splitting the flow of fresh water. Butane was stored in No. 2 well and propane in No. 3 well with washing while products were in storage.

Washing and storage . . . The No. 2 well was circulated for washing at night and butane was stored during the day. This procedure was adopted after it was found that there would be a larger quantity of butane for storage than had been originally anticipated. The No. 2 well was circulated in "reverse circulation." The butane in storage served as a "blanket" which protected the top of the hole giving it a desirable pear shape.

Double annulus . . . In Fig. 1, the annular space "A" is used for injecting gasoline during conventional circulation for washing which protects the top of reservoir and avoids circulation above the point where 8⅝-in. surface pipe has been set and cemented. The gasoline is pumped down this annulus through the face of the surface hole to the bottom of the 7-in. o.d. casing which is approximately 10 ft. below the 8⅝-in. pipe. The gasoline then forms a "blanket" covering the entire roof of the hole, thus directing flow of circulation, and leaving ample overburden support.

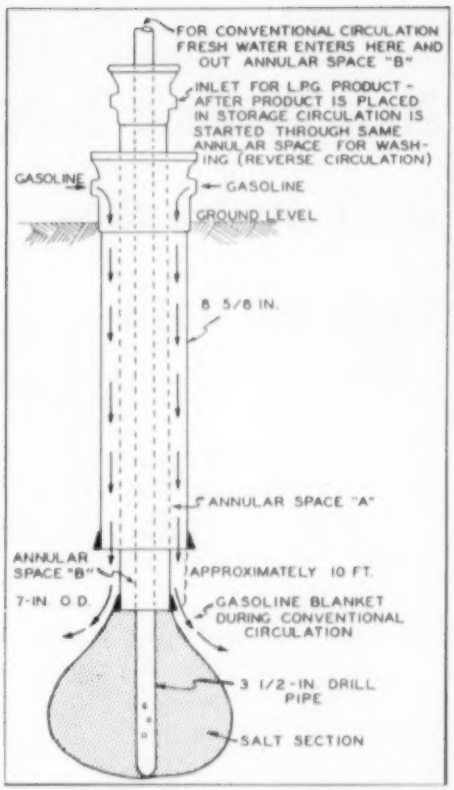
When propane or butane are in storage and washing is accomplished by circulating through annular space "B" out through the 3½-in. drill pipe to the salt-water-disposal well, a more desirable shape of reservoir is attained. However, the daily gain in storage space will be less due to the decreased volume of fresh water circulated with this method.

Salt-water disposal . . . Since Kansas laws require complete disposal of brine, N.C.R.A. drilled a fee salt-water-disposal well at a cost of approximately $30,000. Salt brine was injected into the Arbuckle formation. The injection well was drilled less than 100 yd. from the three storage wells. At a depth of 3,883 to 3,908 ft., oil stains were observed in the Simpson sand and a 2-hour drill-stem test recovered 180 ft. of oil-cut mud, plus 420 ft. of salt Arbuckle was found at 3,933 ft. At a depth of 4,225 ft. loss of circulation prevented further drilling.

After casing was set above the salt layer, a string of new 2⅜-in. steel plastic-coated tubing was run for injecting the brine water into the formation. The annulus was loaded with No. 2 fuel oil to reduce or eliminate any corrosive condition on the inside of the casing.

A 1,000-bbl. wooden tank was set at the disposal hole to collect the brine water for settling in order to prevent plugging of the sand face by foreign matter in the brine. Transite pipe and fittings are used to discharge the brine water from the storage holes to the receiving tank.

Since there was ample water supply and good disposal facilities, salinity saturation was not absolutely essential. However, saturation was improved by minor changes on well tubing. If, as on many underground storage projects today, disposal facilities are a problem, it may be advisable to recirculate water to bring up the salt content to saturation before final disposal.


FOR CONVENTIONAL CIRCULATION FRESH WATER ENTERS HERE AND OUT ANNULAR SPACE "B"
INLET FOR L.P.G. PRODUCT - AFTER PRODUCT IS PLACED IN STORAGE CIRCULATION IS STARTED THROUGH SAME ANNULAR SPACE FOR WASHING (REVERSE CIRCULATION)
GASOLINE
GASOLINE
GROUND LEVEL
8 5/8 IN.
ANNULAR SPACE "A"
ANNULAR SPACE "B"
APPROXIMATELY 10 FT.
7-IN. O.D.
GASOLINE BLANKET DURING CONVENTIONAL CIRCULATION
3 1/2-IN. DRILL PIPE
SALT SECTION

This sketch shows how conventional circulation and "reverse circulation" were carried out using double annulus.

*Underground Security Storage Co., Wichita Falls, Tex. †National Cooperative Refinery Association, Great Bend, Kans.

New Pipeline Being Built on Turnkey Contract Basis

In designing Minnesota Pipe Line, problems had to be solved for the heating and pumping of viscous oil

by Paul Reed
Pipeline Editor

Map of route of Minnesota Pipe Line Co.'s system now under construction for delivering crude oil from Lakehead Pipe Line Co., Inc., trunk line to Great Northern Oil Co.'s refinery to be in operation next year at Hastings, Minn.

FOR the design and construction of Minnesota Pipe Line Co.'s $12,500,000 crude-oil system, Williams Brothers Co. is undertaking the project by a turnkey contract which is believed to be the most comprehensive for any sizable pipeline in the United States.

The system is a 260-mile, 16-in. line for moving Saskatchewan crude from a connection with the Lakehead Pipe Line Co. trunk line near Clearbrook, Minn., to Great Northern Oil Co.'s 25,000-bbl. refinery being erected between Hastings and St. Paul. This will be the first crude-oil line into the Minneapolis-St. Paul area and the first extensive project for bringing Saskatchewan crude to a refinery in the United States.

Crude oil will be transported from the Fosterton area of Saskatchewan through the South Saskatchewan Pipe Line Co. line now being laid to the Interprovincial Pipe Line Co. system. From the international boundary, Lakehead Pipe Line Co. will take it to the Clearbrook connection.

Since Minnesota Pipe Line Co. has been recently organized there has not been opportunity to form executive and engineering departments. Therefore it has been advantageous to contract with Williams Brothers Co. for all functions including surveying, buying of right-of-way, materials and equipment, as well as the design and construction of pump stations and pipeline.

In designing the line, problems had to be solved for the heating and pumping of viscous crude oil. Fortunately the project is favored by terrain sloping toward the downstream end. After outlining the main features and basic plan, this article will discuss the following subjects: (1) tankage, heating and suction boosters; (2) pump stations and controls; (3) hydraulics; (4) pipe, and (5) pipe-laying practices. The project is being built according to advance modern practices.

Capacity of the system ranging from 30,000 to 54,800 bbl. daily will be provided by two stations with three 500-hp. electric centrifugal pumping units at each station, making a total of 3,000 hp. for the system. Initial capacity of the line is regarded as 35,000 bbl. daily.

Handling of two types of crude oil is contemplated. The crude oil will be moved either in batches or as a blend through the Minnesota Pipe Line system to the Great Northern refinery.

Generally the terrain is well cultivated along the route of the line until it reaches the heavily populated areas of White Bear Lake and North St. Paul. The northern section is wooded and broken by lakes and swamps. There are concentrations of boulders in the glacial deposits along the route, and near the twin cities there are rock outcroppings. Most of the terrain is rolling. Elevation at Clearbrook is 1,383 ft. and at the Great Northern refinery, 880 ft. The drop in elevation between these points is 503 ft.

Affairs of Minnesota Pipe Line Co. are directed by J. R. Parten, board chairman, and M. E. Sandlin, president.

Basic Plan

The basic plan for the pipeline provides for the following facilities at terminals and pump stations:

1. At Clearbrook there will be storage tanks, heating equipment, suction booster pumps, and main-line pump station.

2. At Little Falls, there will be main-line pump station.

3. At Hastings, oil will be delivered through a distributing header to the Great Northern refinery.

Decisions for equipment were based on technical adequacy, initial cost, operating or upkeep cost, reliability, and durability.

Reciprocating pumps would provide better operating efficiency but centrifugal pumps are more flexible in varying the pipeline throughput as the crude oil viscosity changes due to variations in average operating temperatures.

Floating-roof tanks were chosen although the installed cost will be about 20 per cent greater than for cone-roof tanks. Savings in filling and breathing expense achieved through conservation of vapor and lower maintenance will pay the additional investment in approximately 2 years.

Tankage, Heating, and Suction Boosters

Tankage at Clearbrook will consist of 400,000-bbl. capacity furnished by four 100,000-bbl. floating-roof tanks. For moving oil from tanks to main pump suction, there will be two booster pumps—one for each of the grades handled.

For blending purposes, devices to measure and control the percentage of each type of crude fed to the main line will be installed.

Steam generators and heat exchangers will be provided to facilitate movement of crude oil by booster pumps from storage tanks to the suction of main-line pumps.

Remote control will be used for all valves at tanks and booster pump manifolds and for suction booster pumps. Tank switching can be carried out by operating switches in the control room of the pump house.

Booster pump motors will have actual 75 hp.; actual speed will me 3,600 r.p.m.

Pump Stations and Controls

Each of the two pump stations will have three centrifugal pumps, each driven by a 500-hp. duct-ventilated electric motor. The units can be operated individually or in series.

Piping and equipment have been arranged so that units will be prepared for operation manually and then started automatically.

The suction valve and vent valve will be positioned manually. Operation of the starting switch will purge the air duct, start the pump motor, then open the motor-operated discharge valve.

The gage and control board in the station office will have starting and stopping switches for the pump starting device. Pilot lights will indicate position or operation of valves and pumps. Indicating gages will show suction and discharge pressure at manifold and main-line pump units. A recorder controller actuated by station pressure will regulate control valve on outgoing line to automatically adapt pump pressures and volumes to throughput requirements.

Remote-reading gages will give tank levels. The gage board will also have instrumentation for crude-oil blending devices. As a safety measure, pneumatic pressure transmission will be used to avoid having oil-gage piping in the control room.

Safety alarm or shutdown devices will protect unsafe and abnormal conditions. Switches will protect pumps against low suction and high discharge pressures and also against high case and high-bearing temperatures. Motors will be protected by high-bearing and high-cooling air temperature switches. A fume detector will indicate explosive or combustible vapors.

Suction booster pumps will be interlocked with main-line pumps to avoid operation without adequate suction pressure. The motor-cooling-air fan will also be interlocked to prevent accumulation of fumes in the air duct system.

Pump-house buildings will be erected with steel-frame, flat builtup roof with masonry lower siding and aluminum upper siding. Each station building will be divided into three rooms—a pump room, office and control room, and a storage and locker room. Office and locker rooms will be suitably insulated against sound and temperature. There will be a traveling 6-ton crane in the pump room.

Communication will be by telephone and teletype provided on an annual rental basis from the local telephone company.

Physical characteristics of a blend of Fosterton Cantuar and Success crudes is as follows:

MINNESOTA PIPE LINE CO.

°A.P.I.	22
Pour point, °F.	Below 10
Viscosity	S.s.U.
Temp., °F.:	
30	2,700
40	1,550
50	950
70	450

A blend of this crude with 20 per cent Redwater crude produces a much less viscous mixture as follows:

°A.P.I.	24
Viscosity	S.s.U.
Temp., °F.:	
30	1,460
40	900
50	610
70	330

Hydraulics

The profile is advantageous since the upstream station is 503 ft. higher than the downstream terminal. No physical terrain features would create any undue restrictions on capacity.

Economic considerations induced selection of the 16-in. pipe diameter which would be large enough for movement of the most viscous crude at the basic throughput rate. The capacity of the system can be economically increased by adding pump stations.

Temperatures underground at depth of 3 ft. are not uncommon at 30° F. Therefore during the winter it is recommended that pumping be limited to Fosterton-Redwater blend of crudes.

Capacity of the system for the pumps selected would be as follows:

Three pumps in series (barrels per day):

Flowing temp.	Fosterton crude	Fosterton-Redwater blend	Redwater at 100 S.s.U.
35° F.	30,000	49,200	...
50° F.	49,800	52,800	60,000
60° F.	52,800	54,800	
Two pumps in series:			
35° F.	24,000	36,000	
50° F.	39,400	44,400	54,600
60° F.	44,600	45,600	

Pipe

A 16-in. o.d. of varying wall thickness was selected as the most practical for the project. Grade X-52 is used for the trunk line and high-pressure lines; Grade B is laid at river crossings.

The working pressure of the system was established as a maximum of 1,200 psi. Wall thicknesses were selected as a function of the hydraulic gradient and were restricted to a maximum as determined by Barlow's formula using approximately 65 per cent of the yield strength as a safety factor.

Wall thickness for the 16-in. pipe was selected as follows: for the manifold 11/32-in.; for the high-pressure sections of the line, 9/32-in.; for sections not subjected to high pressures, ¼-in.

The following table shows the relationship between wall thickness and working pressure using 100 per cent and 65 per cent of the yield strength of the 16-in. pipe for the project:

Wall thickness	Grade	Internal pressure at minimum yield strength (psi.)	Internal pressure at 65 per cent of yield strength (psi.)	Per cent of yield at 1,200 (psi.)
0.500	B	2,188	1,422	54.8
0.344	X-52	2,240	1,456	53.6
0.281	X-52	1,830	1,190	65.6
0.250	X-52	1,630	1,060	58.3

The pipe is buried across swamps and marshes.

The Mississippi River is crossed at two points—one near Little Falls, where extensive dredging must be done, and the other south of St. Paul.

Each section will be tested by air to 100 psi. and this pressure will be maintained for 24 hours.

After the air tests a hydrostatic test with oil provided by the company will be applied at 1,200 psi. and maintained for 24 hours. The intention is to test within practical operating pressure limits.

The line will be completed in ample time to serve the Great Northern refinery to be completed in 1955, which initially will be the principal user of Minnesota Pipe Line. Great Northern expects to start shipping at least 15,000 bbl. daily of Fosterton type crude by June 1, 1955, and to increase shipments to 20,000 bbl. daily by January 1, 1956.

Fundamentals of Gas Lift — 3

How to Design for Continuous Flow

Efficiency of this type of well should be as good as that of natural flow

by Prof. C. V. Kirkpatrick

THE problem of valve spacing should be insignificant when the design problem as a whole is considered. **Correct location of the final operating valve is the critical problem.**

Now, recognizing the importance of the P.I. and assuming a reliable one can be obtained, the design problem resolves itself into a search for answers to the following questions: (1) What is the optimum depth of injection, (2) what is the optimum injection gas-oil ratio, (3) what is the optimum injection pressure, (4) what is the flowing gradient for the optimum injection pressure and gas-oil ratio, (5) if the P.I. has been incorrectly estimated, what remedial measures can be taken.

There is no reason why continuous flow gas lift wells should not closely approximate the efficiency of naturally flowing wells, if the installations are correctly designed.

The best way to present the continuous flow design problem is by problem example. It is emphasized that charts based on statistical averages are only recommended in lieu of specific laboratory and/or pressure-bomb survey analysis. However, statistical charts which are generally available will allow a reasonable approximation of actual data, and the following design example and any actual design using them will be far better than with rule of thumb techniques.

Author is chairman department of petroleum engineering, University of Houston.

DEFINITION OF TERMS

- P = pressure in tubing string
- b = liquid volume factor at tubing pressure, P, and average tubing temperature
- G = total gas (solution and injected) associated with 1 bbl. of S.T.O. (same as producing G.O.R.)
- g = solution G.O.R. at tubing pressure and average tubing temperature
- $(G - g)$ = total free gas at tubing pressure and average tubing temperature
- B = gas volume factor at tubing pressure and average tubing temperature
- $B(G - g)$ = free gas volume factor
- $J_{o\text{-}g}$ = composite volume factor (oil and gas)
- $J_{o\text{-}g\text{-}w}$ = composite volume factor (oil, gas, and water)
- M_A = total weight of production (oil, gas, and water) above injection point
- M_B = total weight of production (oil, gas, and water) below injection point
- Q_o = stock-tank-oil producing rate
- Q_w = water-producing rate
- Q_T = total liquid rate
- Q_M = total mass rate of production

Given:

1. Depth of well = 8,000 ft.
2. P.I. of well = 1.00.
3. Shut-in bottom-hole pressure = 3,000 psia.
4. Back pressure at the tubing = 100 psia.
5. W.O.R. = 10:1 (relative constant for the past 2 years).
6. Gravity of the oil = 40° A.P.I. at 60° F.; specific gravity = 0.826.
7. Specific gravity of water = 1.15.
8. Separator gas gravity = 0.60.
9. Available lift-gas pressure = 650 psi. at well head.
10. Gravity of lift gas = 0.60.
11. Flowing tubing temperature at the well head = 100° F.
12. Tubing = 2½ in.

Required:

The optimum conditions for gas lift in order to produce 40 bbl. of oil per day, with a net G.O.R. not to exceed 4,400 cu. ft. per bbl. of stock-tank oil (S.T.O.).

The above data represent all of the available information; therefore, the problem will be analyzed on the basis of statistical average charts:

1. The reservoir temperature is 70° + (1.6) (80) = 198°, say 200° F.

2. From Fig. 1 the solution G.O.R. at 3,000 psia. and 200° F. is found to be 590 cu. ft. per bbl. S.T.O. Therefore, the injection G.O.R. must be: 4,400 — 590 = 3,810 cu. ft. per bbl.

3. From Fig. 2 the saturation pressure is 2,900 psia.

4. From Fig. 3, the liquid volume

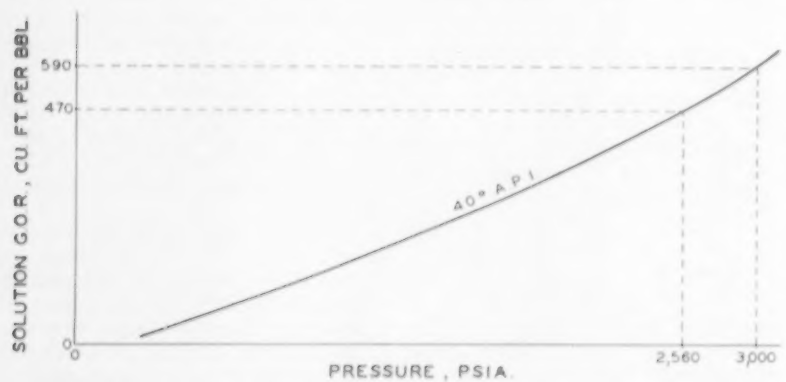


Fig. 1—Statistical charts of this nature are available for all ranges of gas gravity and temperature. This one is for 200° F. and 0.600 gravity.

TABLE 1—TABULAR FORM FOR MAKING CONTINUOUS-FLOW GAS-LIFT ANALYSIS SOLUTION TO MEET LIMITING REQUIREMENTS

No.	(P) (Tubing) psia	(b) SCF / BBL S.T.O.	(G) SCF / BBL S.T.O.	(g) SCF / BBL S.T.O.	(G-g) SCF / BBL S.T.O.	(B) BBLS Space / SCF	B(G-g) BBL Space (Gas) / BBL S.T.O.	J_{p-g} = [b+B(G-g)] BBL Space (oil and gas) / BBL S.T.O.	(J_{p-g}) = $10+J_{p-g}$	Density Total Production: M.J / BBL	Density Total Production: M.5.61J / Ft³	Gradient psi/ft	Average Gradient psi/ft	Distance between pressure points (Ft) = $\Delta P/G_{AVG}$	Depth to Pressure point (Ft)	Vol. % Gas Phase B(G-g) / J_{p-g}
						TRAVERSE BELOW THE POINT OF GAS INJECTION — M_B = 4341										
1	2560	1.255	590	470	120	0.00117	0.1403	1.395	11.395	381	67.9	0.48100			8000'	1.23%
2	2360	1.250	"	420	170	0.00127	0.2160	1.466	11.466	379	67.4	0.4720	0.476	419	7581	1.89
3	2160	1.200	"	370	220	0.00139	0.3060	1.506	11.506	377	67.1	0.4715	0.472	424	7157	2.65
4	1960	1.175	"	322	268	0.00154	0.4130	1.588	11.588	375	66.8	0.4680	0.470	426	6731	3.57
						TRAVERSE ABOVE THE POINT OF GAS INJECTION i·GOR = 3810 — M_A = 4516										
5	100	1.000	4400	0	4400	0.0308	135.5	136.50	146.50	30.85	5.50					92.5 %
6	300	1.010	"	25	4375	0.0100	43.75	44.76	54.76	82.50	14.70	0.122	0.102	1960	1960	79.90
7	500	1.032	"	60	4340	0.00589	25.55	26.58	36.58	123.80	22.10	0.164	0.144	1390	3350	69.90
8	700	1.053	"	100	4300	0.00413	17.75	18.80	28.80	157.30	28.10	0.235	0.199	1005	4355	61.60

M_A = 4516 #/BBL Q_o = 40 BBL/Day Q_oM_A = 181,000 #/Day

M_B = 4341 #/BBL Q_w = 400 BBL/Day Q_oM_B = 173,500 #/Day

Q_T = 440 BBL/Day WOR = 10:1

GOR = 4400 Ft³/BBL

Sep Gas Gravity = 0.60
API Gravity Oil = 40° = 0.825 Sp. Gravity

Lift Gas Gravity = 0.60

INJ. GOR = 3810 Ft³/BBL
SOL'N GOR @ 3000 psia = 590 Ft³/BBL
Liquid Vol. Factor @ 300 psi and 200°F = 1.317
Shut in BHP = 3000 psia
BHT = 200°F

Tubing pressure @ wellhead = 100 psia
Tubing Size = 2½" EUE 6.5#
Wellhead Temp. 100°F

factor at shut-in reservoir conditions is 1.317.

5. 4,400 cu. ft. per bbl. S.T.O. for a W.O.R. of 10:1 = 400 cu. ft. per bbl. of total liquid.

6. Drawdown = 440/1 = 440 psi.

7. Bottom-hole flowing pressure for 40 bbl. of oil per day = 3,000 — 440 = 2,560 psi.

8. Solution G.O.R. at 2,560 psia. and 200° F. = 470 cu. ft. per bbl.

Solution to meet limiting requirement. . . . A solution will be presented first to satisfy the limiting requirements of the problem, and a more detailed solution that illustrates a complete analysis irrespective of the limiting requirements will follow.

The problem can be most conveniently solved by working in tabular form and plotting the results graphically as follows:

1. Plot the flowing gradient **below** the point of gas injection.

2. Plot the flowing gradient **above** the point of injection.

3. Determine the injection depth and injection pressure from above to determine if available surface pressure is ample.

4. Determine the theoretical adiabatic horsepower requirements for the selected injection G.O.R. and pressure.

5. Select and locate the valves.

Table 1 presents the necessary data, and a step-by-step explanation of the solution follows:

For data below the point of injection:

1. First determine the mass rate in pounds per barrel S.T.O. (this rate is assumed constant up to the point of gas injection).

M_B = weight of oil, water, and gas per barrel S.T.O. produced.

(a) Weight of oil = (density of water in pounds per barrel) (specific gravity oil) = (62.4 × 5.61) (0.825) = 289.00 lb. per bbl. S.T.O.

(b) Weight of water = (62.4) (5.61) (1.15) (10) = 4,025 lb. per bbl. S.T.O.

(c) Weight of gas. Recall that below the point of gas injection the only gas associated with the oil is that which was originally in solution, i.e., 590 cu. ft. per bbl.

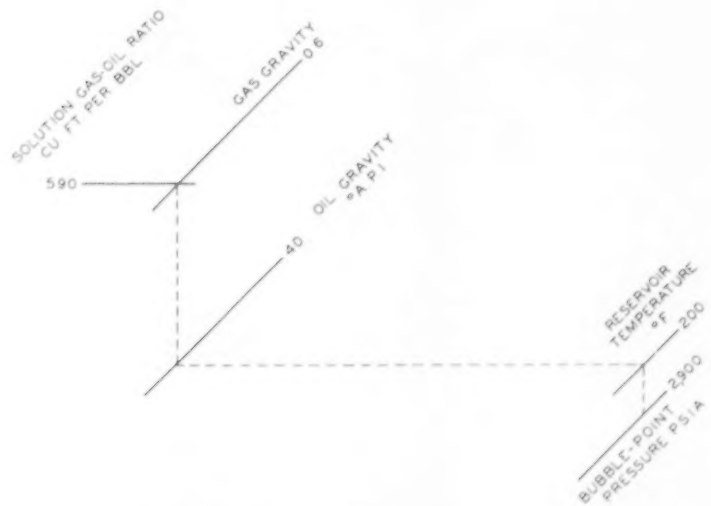


Fig. 2—This portion of a general diagram is taken from A.I.M.E. Petroleum Technology T.P. 2931, 1950.

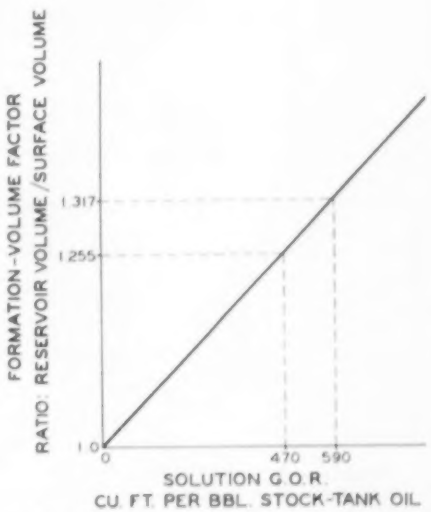


Fig. 3—Diagrams of this nature show the effect of dissolved gas on formation volume of reservoir oil. ("Petroleum Conservation," A.I.M.E., 1951.)

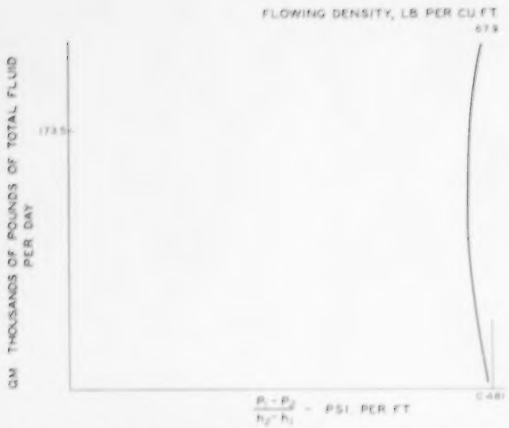


Fig. 4—For finding the flowing gradient in 2.5-in. tubing, charts on this order may be used. (A.P.I. paper 851-26-I).

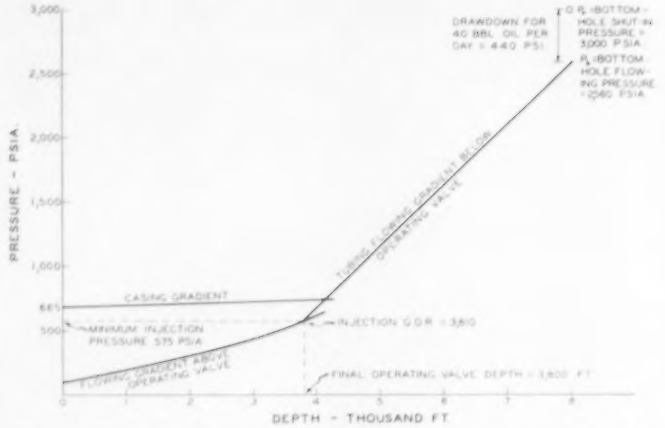

PRESSURE - PSIA
DEPTH - THOUSAND FT
DRAWDOWN FOR 40 BBL OIL PER DAY = 440 PSI
CASING GRADIENT
MINIMUM INJECTION PRESSURE 575 PSIA
INJECTION G.O.R. = 3,810
FLOWING GRADIENT ABOVE OPERATING VALVE
FINAL OPERATING VALVE DEPTH = 3,800 FT

Fig. 6—The results of data presented in Table 1 for a continuous-flow design problem, may be plotted to obtain a better picture of the well characteristics.

= (density of air at 14.65 psia. and 60° F. in lb. per cu. ft.) (gas gravity) (total standard cu. ft. gas).

= (0.0764) (0.6) (590) = 27.1 lb. per bbl. S.T.O.

So M_B = 289.00 + 4,025 + 27.1 = 4,341.

Where M_B = total weight of fluid per barrel of S.T.O. below the point of gas injection.

2. Now $Q_o M_B$ = (4,341) (40) = 173,500 lb. per day where Q_o = S.T.O. production in barrels per day and $Q_o M_B$ establishes a fixed ordinate for use of a gradient chart for 2½-in. tubing, Fig. 4.

3. The starting pressure for the "below injection point data" is the bottom-hole flowing pressure, P_B. This is determined from well P.I. and total liquid producing rate. Hence:

$$P_B = 3{,}000 - 440 = 2{,}560 \text{ psia.}$$

4. g at 2,560 psia. and 200° F. from Fig. 1 = 470 cu. ft. per bbl.

5. b at 2,560 psia. and 200° F. = 1.255 (Fig. 3).

6. G is equal to g at 3,000 psia. and 200° F. and from Fig. 1 is 590.

7. (G – g) = free gas at bottom-hole flowing pressure = 590 – 470 = 120.

(Recall that saturation pressure is 2,900 psia.)

8. B (gas volume factor) can be calculated from the formula:

$$B = \frac{0.00504}{P} TZ$$

So B = 0.00117 at 2,560 psia and 200° F.

9. B (G – g) is the barrels of space occupied by the free gas at bottom-hole flowing pressure and temperature, per barrel of stock-tank oil = (0.00117) (120) = 0.1403).

10. J = b + B (G – g) = composite volume factor = barrels of space occupied by both the free gas phase and the liquid oil phase per barrel of stock-tank oil. This is 1.255 + 0.1403 = 1.395.

It is to be recalled that this composite volume factor is for gas and oil only. In other words, if no water was being produced, it would require 1.395 bbl. of fluid (oil and gas) space at 2,560 psia. and 200° F. for each barrel of stock-tank oil. However, in this example, the well is producing with a W.O.R. of 10:1. That is, for every barrel of stock oil produced, 10 bbl. of water is produced. There is no necessity for determining a liquid volume factor for water because, unlike the oil, its compressibility is so small that it can be neglected.

11. Therefore, the next column $J_{o\text{-}g\text{-}w}$ = 10 + 1.395 = 11.395, the total composite volume factor for gas, oil, and water.

12. Density of total production below point of injection

$$= \frac{M_B}{J_{o\text{-}g\text{-}w}} = \frac{4{,}341}{11.395} = 381 \text{ lb. per bbl.}$$

or 67.9 lb. per cu. ft.

13. Gradient for a density of 67.9 lb. per cu. ft. where $Q_o M_B$ = 173,500 is taken from Fig. 4 and is equal 0.481 psi. per ft.

14. 200-psi. pressure increments will be assumed in order to establish this portion of the curve. Hence for the second line:

$$P = 2{,}560 - 200 = 2{,}360$$

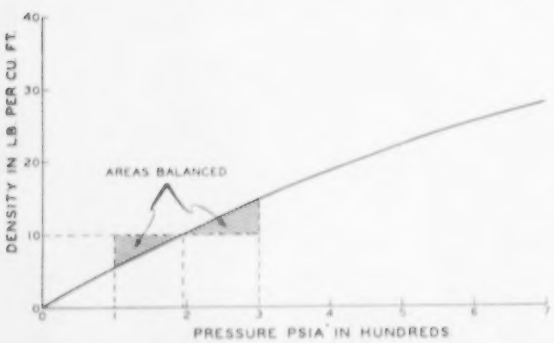


Fig. 5—This plot of density vs. pressure illustrates how to select average density between two pressure points.

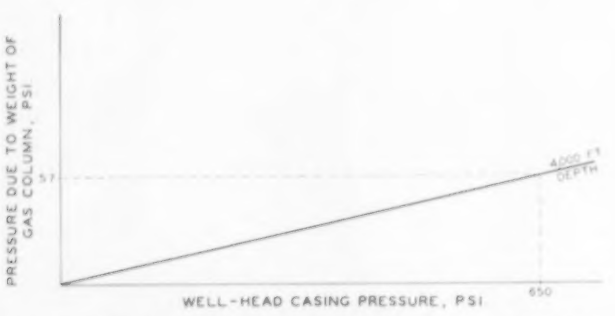


Fig. 7—A plot of the pressure due to weight of a column of gas gives the added pressure at the point of injection.

15. The other values are determined in exactly the same manner as before, using solution G.O.R. charts for the the 200° F. temperature.

16. The average gradient is the average value of the gradient between pressure increments. That is the average gradient between (P = 2,560 psia.) and (P = 2,360 psia.) is $\frac{0.481 + 0.4720}{2}$ or 0.476 psi. per foot.

17. The distance between pressure points is given by P/G_{AVG} where P is the pressure increment assumed and G_{AVG} is average gradient between the pressure points:

$$= \frac{200}{0.4762} = 423 \text{ ft.}$$

18. Depth to the assumed pressure of 2,360 psia. = 8,000 − 423 = 7,577 ft.

19. Now to establish the data for the pressure traverse above the point of gas injection, the starting point is the 100-psia. tubing pressure at the surface. For this traverse the average tubing temperature of 150° F. throughout will be most representative.

In all probability, a well of this type would have a higher surface temperature than the 100° F. assumed because of the high volumes of water the well is making. At any rate, it seems reasonable to assume that the flowing fluid will drop but little in temperature up to the point of gas injection. Even at this point and beyond, the sharpest temperature drop should occur near the surface where the present gas phase begins to increase very rapidly.

In this problem example, it would make little difference whether the 200° F. or 150° F. curves were used throughout, because of the small per cent gas phase throughout most of the traverse. However, in wells producing with high gross G.O.R., i.e., more than 2,000 cu. ft. per bbl. total liquid plus, where the per cent gas phase is approximately 50 per cent at bottom-hole flowing pressure, and the well is making no water, then the average flowing temperature would probably be more representative throughout the traverse.

20. g = 0 at 100 psia. from Fig. 1 (negligible for all practicable purposes) and consequently, b = 1.00.

21. It is to be noted that M_A now is a different value from M_B, due to the injection G.O.R. of 3,810 cu. ft. per bbl. and is equal to:

$$= 289 + 4{,}025 + (0.0764)\,(0.6)\,(4{,}400)$$
$$= 4{,}516$$

where M_A is equal to the weight of the total fluid flowing **above** the point of injection.

22. And $Q_o M_A = (40)\,(4{,}516) =$ 181,100 lb. per day, and the other values are determined as before.

The density for the 100-psia. well-head pressure does not fall within the density range on usual gradient charts, (i.e., less than 10 lb. per cu. ft.). This frequently happens for low well-head pressures and high G.O.R. values. When this condition exists, then the integrated average value of density (which may be determined graphically) between the well-head pressure and some higher assumed pressure must be used. Specifically proceed as follows:

(a) Plot density in pounds per cubic feet vs. pressure at the average flowing temperature. See Fig. 5.

(b) Assume a pressure sufficiently greater than the well-head tubing pressure so as to give an average density in excess of 10 lb. per cu. ft. This can be determined from inspection of the density graph.

(c) From the plot of density vs. pressure, estimate the average density value between well-head pressure and the assumed pressure.

(d) Using this average density, determine the average flowing gradient from the chart.

(e) Determine the depth in feet to the assumed pressure by dividing the difference between the assumed pressure and the well-head pressure by the average gradient.

From Fig. 5 it can be seen that graphical average value of density between 100 and 300 psi. is 10 lb. per cu. ft.

23. Now from the chart, this gives an average gradient between 100 and 300 psia. points of 0.102 psi. per foot.

24. The depth to the various pressure points may now be determined. Fig. 6 shows a plot of the results of the data tabulated in Table 1 with the available casing pressure curve included. The casing pressure gradient may be established by means of Fig. 7.

The pressure due to the weight of a column of 0.6-gravity gas at the same average temperature as in the problem is 57 psi. for a well-head pressure of 650 psi. (665 psia.) and 4,000-ft. depth. These two points establish the casing gradient.

It is seen from Fig. 6 that the 650 psi. at the well head will give ample differential across the operating valve. The pressure in the tubing at the point of injection is 575 psia.

The valves to be used should be automatic continuous flow with all set at the same or slightly decreasing charged pressure. The valve-port size should be large enough to pass the total gas requirement plus 50 per cent with a 100-psi. operating differential.

The highest possible operating pressure should be used because higher operating efficiencies are then obtained.

New Developments Aid In Artificial Lift

By Barney O. Carlson

THERE have been recent developments in artificial-lift equipment which appear to offer advantages as concerns the pumping of deep wells. One now available for general use has made it possible to pump deeper without increasing rod stresses. This device is a hydraulic rod weight counterbalance in the well.

The hydraulic tool is located in the tubing and rod string at a point which is approximately halfway between surface and the pump. The tool plunger, which is made up in the rod string, works in a barrel which is a part of the tubing string. The top of the plunger is subjected to the low pressure in the casing, while the bottom of the plunger is working against tubing pressure. An upward or counterbalancing force results from the differential pressure across the plunger. The rod load above the tool is reduced by an amount equal to the effective counterbalance. The counterbalancing force can equal only a part of the rod load below the tool.

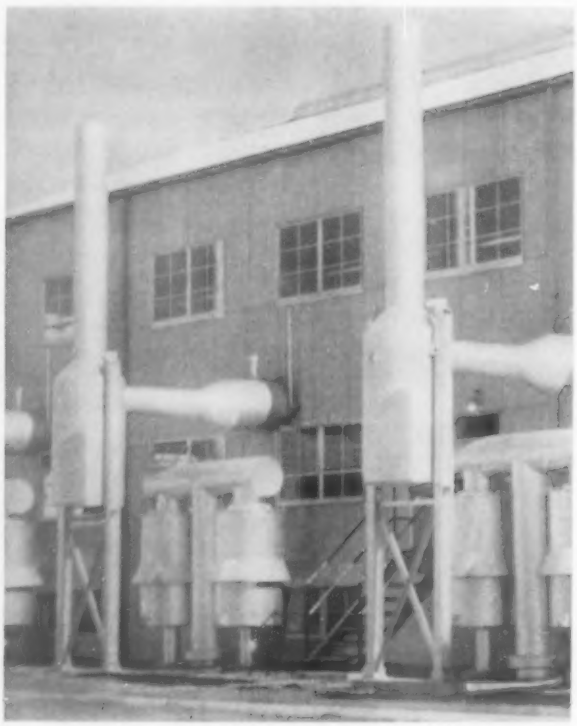
Two deep-pumping installations were put into operation in West Texas a few months ago with the down-hole hydraulic counterbalance. The operator has reported satisfactory results and that the reduction in polished rod load was as calculated.

Automatic controls . . . One operator is preparing to install a four-speed electric motor with automatic controls on a four-wheel hydraulic-pumping installation. With a conventional single-speed electric motor there is a relatively constant power oil output. In the event that all wells are not being pumped, some oil will be bypassed, and bypassed oil is wasted energy. The proposed system should eliminate this energy waste. In addition, with the automatic controls, any well can be pumped on the desired schedule without regard for the other wells. That is, the wells can be operated as if they were equipped with individual pumping units.

Plunger lift is not new, but its application to deep-well pumping is relatively new. The traveling plunger operates between the fluid and expanded formation and injected gas to force fluid to the surface. The purpose of the plunger is to reduce to a minimum slippage of gas past the fluid.

Author is with Shell Oil Co., Hobbs, N. Mex. From a paper presented at Texas Tech 1954 Oil-Lifting Methods Short Course.

Surfaces were prepared by cleaning to bright metal with sander



Mufflers at Greenville station after 15 months' service.

SILICONES—New Tools for Petroleum Operations

...They are useful in many field-plant painting applications

by Jock Oliver and Max Leavenworth

DURING the past several years the industrial usefulness of silicone-based paints has been proved by a steadily increasing use of such finishes to protect and to maintain the appearance of equipment exposed to high temperatures and corrosive atmosphere.

Experience in thousands of field applications has definitely established the fact that the life or performance of a properly formulated silicone coating in high heat and corrosive service is dependent on the thoroughness with which the metal surface is cleaned and prepared for painting. The primary requisite is complete removal of all mill scale, rust, dirt, grease, oil, organic finishes or any other matter foreign to the surface.

Authors are associated with Dow-Corning Corp., Dallas.

Cleaning method . . . The preferred method for preparing a metal surface is by blast cleaning to white metal as defined in Steel Structures Painting Council's SP-5-52T. Commercial Blast Cleaning, SSPC-SP-6-52T, is substantially less expensive and gives a thoroughly adequate cleaning.

It would be impractical, however, to assume that surface preparation will always be or that it must be perfect to obtain a satisfactory or even an excellent performance from a silicone finish. In many operating plants, it is impossible or against safety regulations to employ blast cleaning, so other methods for adequate preparation of the surface must be used.

Hot surfaces . . . For example, Texas Gas Transmission Corp., of Owensboro, Ky., is one of the many large pipeline companies which have standardized on silicone-aluminum paint to keep their gas-engine mufflers, stacks, and hot piping as attractive in appearance as other equipment that is not exposed to high operating temperatures. This company has used various methods including blast cleaning, motor sanding, and hand cleaning to prepare metal surfaces for a silicone finish at adjacent plants in Mississippi.

At Clarksdale, Miss., mufflers and stacks were first painted during con-

struction. They were then blast-cleaned and given two coats of silicone-aluminum paint. The cost of preparing the metal and applying two coats of silicone paint is as follows:

Labor, sandblasting muffler and stack—	
One man 4 hours at $1.85 per hour	$7.40
Setting scaffolding, one man 3 hours at $1.85 per hour	5.55
Painting muffler and stack (two coats) one man, 4 hours at $1.85 per hour	7.40
Total	$20.35
Material—	
1 Yd. of sand at $4.50 per yd.	$4.50
1 Gal. silicone aluminum paint	17.50
Total	$22.00
Total cost of blast-cleaning muffler and applying two coats of silicone aluminum paint	$42.35

As these figures indicate, a silicone finish would only have to last about twice as long as an organic coating to be economically sound. Experience in such applications shows that a two-coat application of straight silicone-aluminum paint has an effective service life of 24 to more than 36 months.

Maintenance . . . At the Clarksdale plant, no maintenance of mufflers was required for about 3 years when rust began to show through the paint. This required hand-cleaning with scrapers and wire brushes and repainting by company personnel.

Costs for hand-cleaning and repainting were as follows:

Labor, hand-cleaning—	
Two men 4 hours each, $1.85 per hour	$14.80
Painting (two coats) one man 4 hours at $1.85	7.40
Total	$22.20
Material, 1 gal. silicone-aluminum paint	$17.50
Total cost hand-cleaning and painting with two coats of silicone-aluminum paint	$39.70
Area of muffler and stack, sq. ft.	225
Surface temperatures (°F.)	400 to 600

Hand-cleaned repaint jobs generally have an effective life of from 18 to 24 months or more. Cost of repainting may be lessened and paint life extended by good inspection and repainting before film deterioration.

Gas-engine mufflers and stacks at Greenville, Miss., had deteriorated badly after the station had been in operation for about 2 months. Mufflers and stacks had been painted at the factory with an organic heat-resisting coating before they were shipped to Greenville.

To bring mufflers and stacks up to standard appearance, it was necessary to remove all sloughing and peeling paint, rust and mill scale before applying two coats of straight silicone-aluminum paint. As the plant was in operation, surfaces were prepared properly by cleaning to bright metal with a motor sander. Care was taken to use coarse grit paper in this operation to avoid producing a polished surface.

Costs were as follows:

Labor, cleaning muffler and stack—	
One man 16 hours at $1.85 per hour	$29.60
Painting mufflers and stack (two coats), one man 3 hours at $1.85 per hour	5.55
Total	$35.15
Material—Paint—	
1 Gal. silicone-aluminum paint at $17.50	$17.50
Total cost of labor and material	$52.65
Area of muffler, sq. ft.	225
Surface temperatures (°F.)	400 to 600

This type of cleaning and painting provides an average effective paint life of 18 to more than 28 months. A photo shows mufflers at Greenville station after 15 months' service.

These cases demonstrate the practicality of silicone coatings in hot and corrosive service.

Pollution Control Symposium

In the article "Chemical Flocculation of Refinery Waste . . ." by Roy F. Weston and R. G. Merman *(The Oil and Gas Journal, August 16, 1954)* capacities were erroneously given in thousands of gallons per day. Specific corrections are: In first sentence of article on page 118, the figure "10,000 gal. per day" should read, "10 million gallons per day." In the right-hand column on page 118 the figure "19.2 thousand gallons per day" should read "19.2 million gallons per day." In Table 2 on page 120 under the heading "Flow," instead of "1,000 gal./day" substitute "1,000,000 gal./day."

Report on Texas Water

Texas streams annually supply more than enough water but ways are needed to conserve and distribute it, Dr. Walter L. Moore, of University of Texas, asserts.

Approximately 63 million acre-feet of water is available in intrastate and bordering streams, Dr. Moore, a civil engineer and water-control expert, says in a report to the Southern Regional Council of State Governments.

Texans now use only 8.5 million acre-feet of water from streams and wells annually, he adds. Irrigation takes 51 per cent, manufacturing and industry, 30 per cent; municipal and domestic users, 7 per cent, and storage losses, 12 per cent.

The fifty-third legislature enacted laws strengthening powers of the State Board of Water Engineers, primary agency controlling Texas water, Dr. Moore reports. The legislature also established a nine-member water resources committee now working on a long-range plan for statewide water conservation and development as a resource.

BOOKS

The Abilene (Tex.) Geological Society announces the publication of six composite electric-log and lithological log columnar sections for the following counties in the West Central Texas area: southeastern Coke County, southwestern Fisher County, northwestern Haskell County, northeastern Nolan County, southeastern Nolan County, and southeastern Stonewall County. These logs are prepared on a scale of 1 in. = 100 ft. and show the accepted stratigraphic units for the geologic column penetrated and the producing horizons for the various producing areas pertinent to the respective logs. The lithology is shown diagrammatically as to facies changes in the respective areas. These logs may be purchased at a price of $2.50 each or a set of any three for $7, or a complete set of the six logs for $10. Orders for these logs may be placed through the Abilene Geological Society, c/o the Secretary, P. O. Box 974, Abilene, Tex.

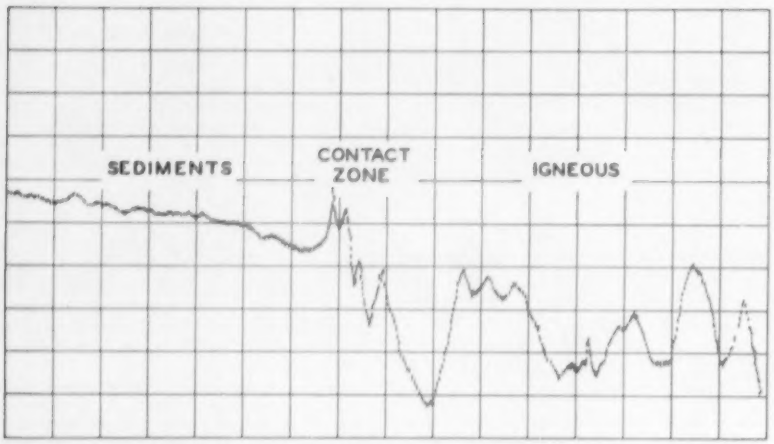
ESSENTIALS OF INDUSTRIAL MANAGEMENT, by Lawrence Bethel, F. S. Atwater, George Smith, and H. A. Stackman, Jr. Published by McGraw-Hill Book Co., Inc., 330 West Forty-second Street, New York 36. 449 pp., $5.50.

Here's an instructive, well-balanced, comprehensive text that offers a practical approach to learning the fundamentals of a complex field of growing importance. Designed for either classroom or home-study use, the book's 18 chapters cover every main phase of industrial management from materials control to industrial relations. Each chapter is divided into four sections: presentation of basic questions; presentation of basic principles; illustration of principles; and case studies for the practical application of the stated principles. Because each of the authors is engaged in a different field of business, the approach to each subject is balanced and impartial. The net result is a textbook for industrial management that students and management men alike will find highly instructive in its presentation of the newest techniques now in use in American industry.

BIBLIOGRAPHIC SURVEY OF CORROSION, 1948-49. Published by the National Association of Corrosion Engineers, 1061 M&M Building, Houston 2. 346 pp.

Designed as a practical guide to corrosion literature, this text is the third in a series by N.A.C.E. covering the literature published both here and abroad in the 5-year period 1945-49. Brief abstracts of all pertinent material are arranged in eight categories: general; testing; characteristic corrosion phenomena; corrosive environments; preventive measures; materials of construction; equipment; and industries. The bibliography is fully crossindexed for easy reference.

This Mobile Magnetometer



Accurately Maps These Contacts

. . . Here's exploration's latest tool

by Norman S. Morrisey

MOST recent aid to the oil finder is the mobile magnetometer, a truck-mounted version of the airborne instrument. Originally developed for the mining industry, it can be used to map regional magnetic features that are of paramount importance to oil geologists. In addition, it can be used to map local magnetic anomalies as small as 25 to 50 gammas.

The MoMag* equipment is best suited for areas of fairly level terrain, preferably with section-line roads and where magnetic data reflect subsurface features such as fault problems, relatively shallow basement conditions, or steeply dipping sediments that are covered by shallow alluvium.

The mobile magnetometer is intended to bridge the gap between the slow but versatile station-reading hand magnetometer and the fast but expensive airborne unit. Under favorable conditions reliable results are obtained at a cost of about $5 per profile mile.

*MoMag is the trade mark of United Geophysical Co., Inc.

How it operates . . . The instrument electronically detects and continuously records the earth's total magnetic field intensity. It is sensitive to any anomalous condition regardless of the orientation of the field. It is mounted on a specially designed four-wheel drive truck and operates at speeds up to 30 m.p.h.

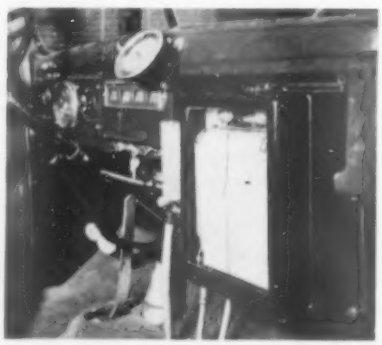
Electronically controlled servo systems automatically orient the magnetic detector to give maximum intensity readings. The recorder graphs the magnetic data continuously and is coupled with the vehicle drive in order to relate the longitudinal scale of the records to the distance traversed. The scale factor is variable and may be chosen as desired. The magnetic intensity is recorded directly in gammas on the chart. The instrument records are produced with rectilinear coordinates and an endless repeating chart scale. Thus the record portrays an easy-to-read accurate picture of anomalous magnetic profiles.

Instrument worth proved by field tests . . . Outstanding results have been obtained during field tests of the mobile magnetometer, especially in regions having significant variations of magnetic susceptibility.

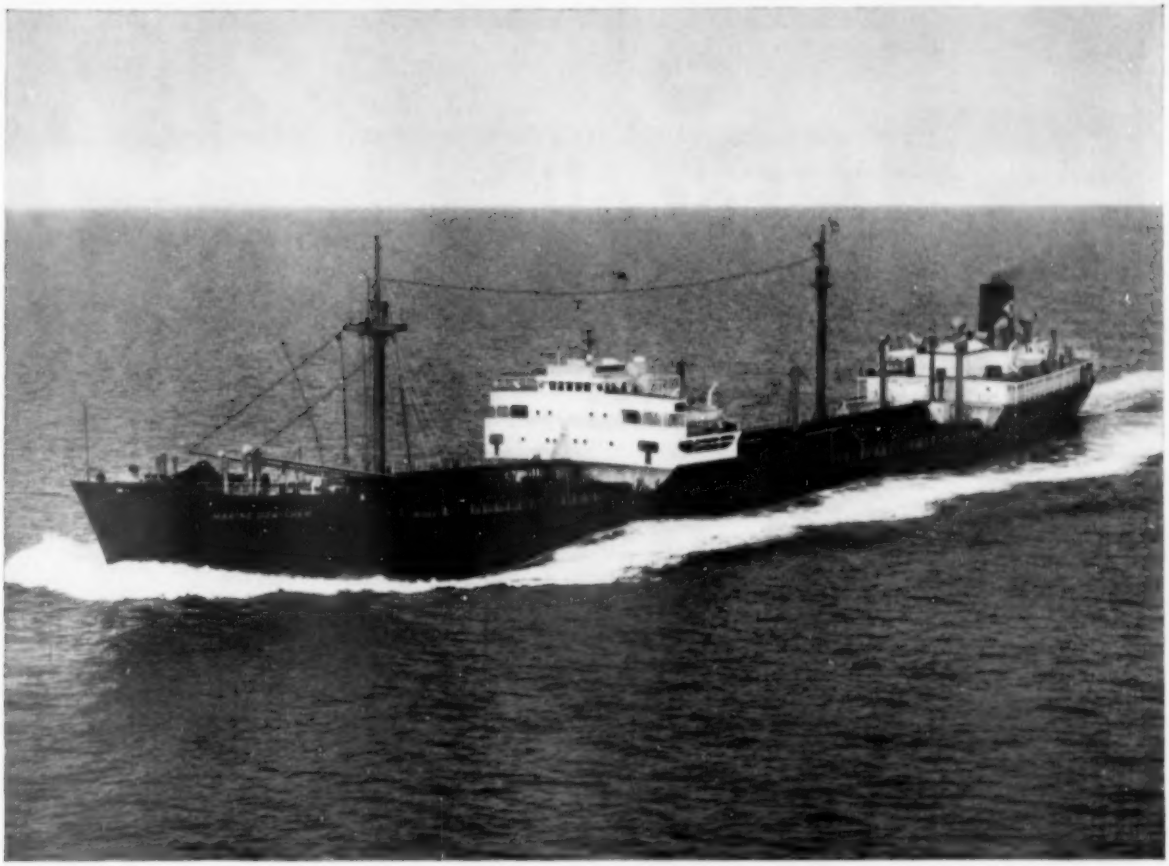
Continuous recorded charts permit reconstruction of average profile curves with the elimination of localized highs and lows. It is thus possible to delineate low-relief anomalies in spite of interference from near surface features such as bridges, pipelines, railroad tracks, etc.

Accurate position control is possible by taking records over roads or field survey lines. The truck-mounted unit is equipped with a voice-recording system so that numbered points on the chart can be correlated with tiein points such as road intersections, bridges, or section corners.

As is the case in nearly all geophysical surveys, the magnetic data are not an end product in themselves but rather a source of subsurface information to aid the geologist in his search for oil.



MoMag operator can observe the magnetic profile constantly and tie significant anomalies to road intersections or other check points.



The S.S. Marine Dow-Chem on her delivery trials.

First All Ways

The first oceangoing tanker specifically designed and constructed for the transportation of liquid chemicals, the S.S. *Marine Dow-Chem* is another example of the many contributions Bethlehem has been making to shipbuilding progress for half a century.

Solving the complex problems posed in the waterborne movement of high-density chemicals, including synthetic organic compounds, inorganic acids and caustics, the *Marine Dow-Chem* can carry as many as 11 different products simultaneously with assurance that her cargo will have the same degree of purity at discharge as when originally loaded.

That Bethlehem was selected to design and build the first vessel of this new class was only logical. Because Bethlehem, for almost 50 years, has been a pioneer in the research and development of waterborne craft of every type. For the dependable, economical and safe transportation of an ever-increasing range of chemical and petrochemical products, Bethlehem-built vessels are **first all ways!**

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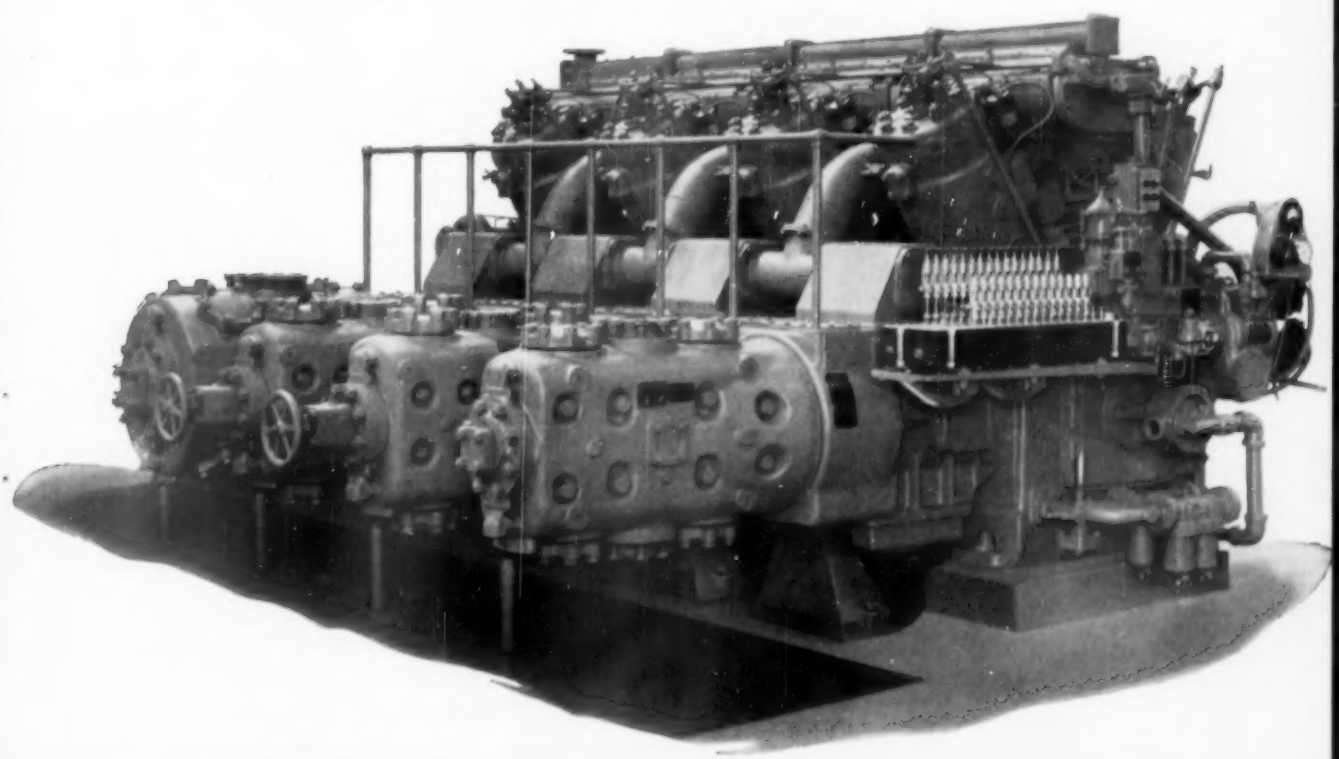
The new, packaged GMXA gas engine-driven compressor offers the many advanced engineering features of the Cooper-Bessemer V-angle design . . . complete with all auxiliaries and piping — ready to go to work!

Improving upon the field-tested and industry-accepted GMX, a few of the outstanding GMXA advantages include lower peak firing pressures and reduced exhaust gas temperatures, higher scavenging air ratios at all loads, high allowable compressor piston rod loading, small space requirements per horsepower, and ample working space around power and compressor cylinders.

With the introduction of the packaged GMXA, Cooper-Bessemer presents to the oil and gas industry a complete, quickly installed, easily transported, and highly efficient compressor package — offering big savings on operating expense and installation time and cost.

Packaged by Southwest Industries

For fast service and delivery . . . in the heart of the oil and gas country . . . packaging of the Cooper-Bessemer GMXA is handled in Texas, Louisiana, Arkansas, Oklahoma, and New Mexico: — by Southwest Industries, Inc. of Houston, Texas. In these five states, GMXA quotations can be procured from either Southwest Industries or any Cooper-Bessemer office.



by **Cooper-Bessemer**

MOUNT VERNON, OHIO AND GROVE CITY, PENNA.

Tulsa Shreveport St. Louis Los Angeles Chicago

PLANNING FOR MAJOR-UNIT TURNAROUNDS

THE expenditure of manpower and material on the turnaround of refining units accounts for about one-third of the maintenance costs of a refinery.

This very appreciable item in the refinery cost budget bears close inspection and calls for detailed planning. This panel discussion consists of four papers: (1) Coordination in Planning for Turnarounds, (2) Refinery Maintenance During Operation, (3) Use of Standards to Control Maintenance Costs, and (4) Organizing and Scheduling Procedure for Fluid Catalytic Cracking Unit.

These articles give insight to four phases of the turnaround procedure and offer solutions to many of the problems encountered. The papers were presented during the mid-year meeting, A.P.I. Division of Refining.

1. Coordination Will Reduce Turnaround Down Time

by Allen Collins
Shell Oil Co., Wood River, Ill.

TURNAROUND planning starts when a process unit is conceived, perhaps for budget purposes; when decisions are made as to process integration and flexibility throughputs, refinery heat and material balances, and intermediate storage. All these matters require down-time consideration, and an assumption is made early in the game to the effect that the down time shall be 3 or 5 per cent.

This assumption is basic in nature, and becomes a binding commitment to the maintenance man; to him, it means the plant can be down 2 or 3 weeks per year. This is turnaround planning in the truest sense.

Be certain the organizational structure in the refinery permits the participation of qualified maintenance people at this stage, and that it encourages maintenance men to become qualified for such participation!

To get under way . . . Turnaround planning gets closer to home when the unit is modeled, figuratively, and the design gets under way; when the over-all layout is agreed upon; when decisions are made to valve or not to valve parallel exchangers; when matters of interchangeability and "spares" enter the picture; when metallurgy is considered; when heaters, machinery, controls, and gaskets are selected.

Such decisions are critical, of course; for they affect turnaround planning and costs for the life of the unit. This is the time, above all others, to induce the active and enthusiastic participation of all specialized organizational groups — maintenance men, operating personnel, and engineers. It is of no matter whether these men are technical or nontechnical by degree or background.

Unfortunately there is a natural tendency for practical men who have been reared in the field, when faced with design problems, to think in terms of physical convenience on the job; to be cynical about capital dollars; and to shy away from "front office" activity. In the same sense, there is a tendency for technical people charged with design to hole up in the office and to forget for convenience the unhappy practical experiences they themselves had in the field, perhaps only a few years ago.

The problem of effectively blending practical and technical know-how into over-all plant designs is a critical one for management. It is a problem of keen, unbiased appraisal; of conviction with regard to objectives; and of constant organizational development. The success of turnaround planning depends in large measure on the effectiveness of the team effort in design, for no amount of planning effort can rectify original design deficiencies.

Turnaround planning . . . Fundamentally, a unit turnaround comprises a multitude of independently simple jobs related only by the fact that they cannot be done while the unit is in operation.

The individual jobs, isolated from turnaround conditions, would be handled as everyday maintenance activity; each would be analyzed in advance, probably by a technical man; each would be reviewed objectively with a foreman selected for the job; and each would be completed by the foreman through normal planning methods and with a minimum of confusion. In a going organization there is no problem here!

Let us do exactly this on our turnarounds! The whole mysterious business of turnaround planning is just this simple: a well-informed foreman, assigned in advance to every known job—provided with the men, tools, and materials he requires.

Management levels . . . The controlling factors in planning are at management levels. Management must encourage and insist on active long-range action on the part of the technical staffs in order that the maintenance organization may have time to evaluate the turnaround work load, recognize bottlenecks, and develop specific plans.

Management itself must act firmly and expeditiously in appraising justifications; approving projects; obtaining authorization for expenditures, if necessary; streamlining red tape; and discouraging last-minute additions or changes. It is insufficient and expensive, both from the standpoint of morale in the field and down time, to rush approvals, drawings, and specifications to the field by special messenger on the Friday afternoon before a week-end shutdown!

Turnaround confusion, in the main, is the direct result of poor planning.

Three suggestions . . . I have three suggestions and one warning involving a refinery organizational structure which

will contribute to good turnaround planning:

1. Provide experienced engineers, on a full-time basis, on major process units in the field, who are to become intimate with the equipment involved, to live with the operating staff, and to spearhead turnaround and other projects from conception to completion. Call these men "area engineers." Give them freedom of action, and a line to management. Place the responsibility squarely on them to prepare justifications; to get approvals; to push design work and material ordering; to expedite deliveries; and to present the individual turnaround jobs to the maintenance group objectively and in detail.

2. Assign one man in the field to balance manpower loads between active jobs and proposed jobs—whether they be construction or maintenance by nature, daily or turnaround by timing. Call him a "planning coordinator." Expect him to participate actively in the planning of operations and turnarounds to the extent that he has an intimate knowledge of relative job priorities, and let him live in the field and guide the maintenance effort.

3. Assign a well-proven nontechnical supervisor, on a full-time basis, to head up all maintenance activity, regardless of craft, in the process-unit area throughout the year and during the turnaround. Call him the "zone supervisor." His stock in trade is his practical judgment and knowledge of the unit itself, i.e.: the particular hazards involved; applicable craft jurisdictions and rules; foremen abilities and attitudes; the relative skill, and the likes and dislikes of craftmen; the availability and limitations of tools and equipment; and the estimating of manpower requirements.

The area engineer, the planning coordinator, and the zone supervisor comprise a turnaround team. As a team, they require practice to gain confidence and become proficient.

Do not consider these jobs as training jobs for young men gaining experience. These are key jobs in the maintenance organization. These are jobs for men. Experience and continuity are all-important on this team; for, in the final analysis, the responsibility for turnaround planning rests principally in their hands.

2. Maintenance During Operation

by Claude H. Trotter
Phillips Petroleum Co., Bartlesville, Okla.

REGARDLESS of process, the planning for our major-unit turnarounds is basically the same for each major unit. The planning usually starts in the manufacturing department. This department, guided by the over-all unit-shutdown schedule, formally notifies all contributing sources that work items to be done during the coming turnaround must be submitted by a specified date.

Most work items are received from the manufacturing, mechanical, process-engineering, mechanical-engineering, and equipment-inspection groups. Each contributing source submits its work items in detail, and provides technical data, material specifications, and similar details. These items are incorporated on a consolidated work list.

When the work list is prepared, attention is given to proper accounting charges and to the grouping of items into the various work areas on the unit. Items are further segregated according to whether they can be done prior to or after the turnaround, or whether they must be done during the turnaround. Preturnaround jobs include the installation of temporary piping for chemical cleaning, the erection of temporary scaffolding, the locating of replacement materials and equipment near their final location, and the doing of some actual repairs when the equipment can be made available.

Approximately 30 days prior to the shutdown date a meeting is called by the manufacturing department. Attending this meeting are heads of the various groups which request most of the work items, and other personnel directly concerned. Each item is reviewed, and it may be subject to question regarding concept, method, or degree.

In general, it is the responsibility of the manufacturing department to approve, add, or delete items, according to the established condition of the unit and its importance to the over-all operating situation. As a result of this meeting a revised and final work list is prepared. When the final work list is given to the maintenance-planning group, the latter is also notified as to the estimated maximum offstream time permissible. The maintenance-planning group prepares the turnaround work schedule from the work list.

Planning the schedule . . . When it prepares the turnaround schedule, the planning group takes each item and breaks it down according to the order, or sequence, in which each of the component parts should be done. The craft, the number of men, and the number of hours required are indicated for each sequence. The day, shift, and hour for various equipment inspection sequences are also included. "Into shop" and "out of shop" dates are shown.

The completion date for each job is indicated. In order to fit these data into an integrated plan, the staffing of the bottleneck jobs is scheduled first. The remaining jobs are then fitted into the picture so as to level off the day-to-day manpower requirements. The bottleneck jobs are staffed on a 24-hour basis; however, only 10 to 15 per cent of the manpower is required on the night shifts.

No overtime is scheduled, and in the event that the work schedule indicates the work cannot be completed within the allotted down time, the manufacturing superintendent recommends the deletion of certain items; or he recommends overtime, the obtaining of additional manpower, or the extension of down time. These alternatives are often used in combinations rather than individually.

When the schedule is made final, it is reviewed in detail with the supervisor in charge of the turnaround. Additional materials are ordered as required. Supervisory and hourly personnel are assigned on an area basis. Prior to the turnaround, key personnel are made familiar with the material and work requirements in their area. Drawings, prefabricated piping, and other materials are also handled on an area basis. Areas are determined either geographically or by work load, or both.

Offstream operations . . . When the unit comes offstream, the turnaround supervisor assumes sole responsibility for the execution of the plans as developed. He is in direct charge of all work and all crafts. Each morning he conducts a short meeting which is attended by key personnel. They review the work progress and make immediate decisions on items which must be added to, or deleted from, the work schedules.

The turnaround supervisor checks to see that the planning group is advised as to the completion and the staffing status of each job by 3 p.m. each day. The planners then prepare the next day's work schedule for each area. Job staffing, shifts, craft sequences, special tooling, and other pertinent data are indicated.

The detail of the planning employed

may seem complex. However, our experience indicates that it is well justified. We have staffed our planning group with experienced people who have good judgment and knowledge. We have a dynamic, influential planning group.

Probably our most noteworthy achievement since we started these procedures has been a 13-day 1-hour turnaround (oil out, to oil in the reactor) on a fluid catalytic cracking unit which has a design capacity of 30,000 bbl. per day, and which operates at 37,000 bbl. per day The usual extensive repairs, replacements, and additions were involved. Extraordinary items required approximately 20 per cent of the total manpower.

Approximately 31,900 man-hours of straight time and 8,300 overtime hours were worked. Of the 42,000 total man-hours, 1,800 were by contract forces. This was our first major turnaround involving the use of the aforementioned planning procedures, and the first major turnaround on this catalytic cracking unit. We believe we can reduce our next down time by approximately 2 days as a result of the experience and know-how we have gained from this turnaround.

3. How to Use Standards to Control Maintenance Costs

by E. C. Newton
Atlantic Refining Co., Philadelphia

ATLANTIC develops its "best" methods for all pertinent maintenance activities, and sets them forth in fully documented form. Then craftsmen and front-line supervisors alike are trained in the practical application of these methods, so that each can perform his job efficiently and effectively in a standardized manner.

Once the methods have been developed and standardized, the next logical and essential step is the development of realistic engineered job times based on the standard methods.

Utilizing these engineered times, a competent corps of maintenance engineers develops and plans all jobs to be done in each refinery area. Then, in accordance with a strict priority schedule set up by top refinery management, a work-control group schedules all available manpower on a plant-wide basis.

Accurate and complete records initiated by the work-control group provide management with a clear picture of work backlog, craft manpower avails, job manning according to priority, adherence of line supervision to schedules, and the efficiency of manpower utilization.

These data furnish management with knowledge of the volume of work performed for the number of maintenance dollars expended; they highlight critical training needs, and provide a medium for initiating corrective action and maintaining a realistic cost control.

An example . . . To illustrate the use of this standardization technique, a refinery processing-unit turnaround provides an excellent example.

During the unit offstream repair period work progress is closely followed by zone engineers. Special attention is given to each "inspection item" for which fabrication or special material-procurement problems are indicated for the following turnaround. At this time all required measurements, sketches, job developments, etc., are obtained. Also any ideas for possible methods' improvement are logged for future investigation and exploitation.

Immediately following the turnaround the performance and the manpower utilization are analyzed. A comparison of actual vs. planned manpower expenditures indicates what, if any, corrective action is necessary.

Following this analysis and review the plan for the next turnaround is immediately begun. For this plan all work pertaining to the turnaround is divided into three classifications, viz.: (1) preturnaround preparation and post-turnaround cleanup; (2) repetitive turnaround jobs, and, (3) special major jobs. All such work is plotted on Gantt charts showing time requirements, manpower requirements by craft, and sequence of craft operations.

Preturnaround preparation and post-turnaround cleanup are mainly routine and repetitive, and can be charted with considerable accuracy.

Each phase of repetitive turnaround work (i.e., furnace work, tower work, exchanger work, pump work, etc.) is charted in four sections: (1) the work which is known to be required, (2) the mechanical inspection work which is estimated on the basis of historical records, (3) the refinery-unit operator's list, also estimated on the basis of historical data, and (4) the normal contingency work which develops during the turnaround—again estimated from past data.

Each Job Fully Planned

Each special major job, such as tower lining, tower-tray replacement, etc., is fully planned from the information acquired during the turnaround period, and is charted as a separate item.

Approximately 1 month after the unit is back on stream, a list of mechanical inspection items which are known to require attention on the next turnaround is made available. These jobs are then formally planned and inserted on the Gantt chart in place of the estimate. Similarly, about 1 month before the next turnaround, the operator's repair list is made available.

This work is also formally planned and inserted on the chart in place of the estimate. When the unit is taken offstream, all work is fully planned and scheduled (with the exception of contingency work which, of necessity, must remain as an estimate), and manpower allocation has been accomplished in a deliberate manner. It should be pointed out that the estimates of mechanical inspection and operator's work requirements are plotted prior to the issuance of the lists so that, in the event of an emergency shutdown of a unit, a plan is ready which encompasses all information available to date.

Down-time reduction . . . This procedure, stemming directly from the development of standardized methods, is being fully utilized by all sections of the maintenance department, and is effectively improving maintenance and construction operations. For example, the down time and man-days of work required for the turnaround of the Philadelphia refinery's 34,000-bbl. per day fluid catalytic cracking and fractionating unit has been consistently reduced from 27 days down time and 12,258 man-days of work in 1948 to 10⅔ days and 6,402 man-days in 1953. Also it is the opinion of refinery management that the relatively large amount of construction work which has been completed recently could not have been accomplished with the same degree of efficiency without the effective manpower scheduling controls which this method's standardization program has provided.

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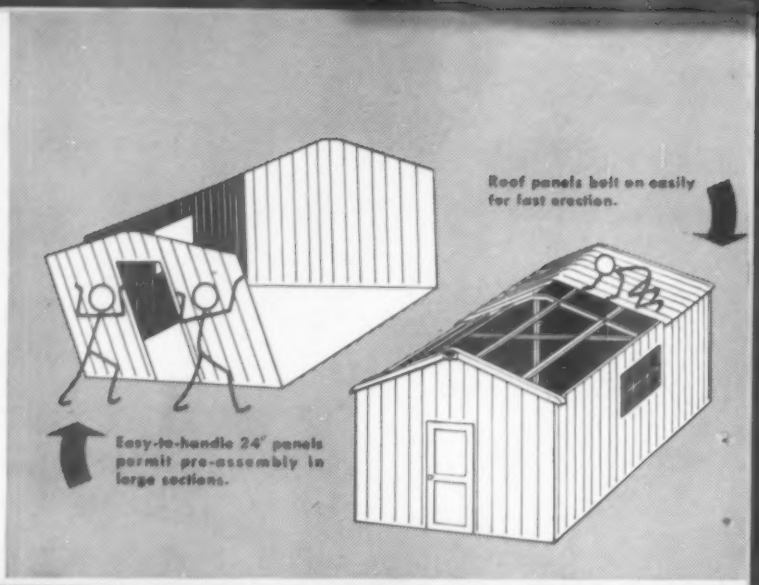

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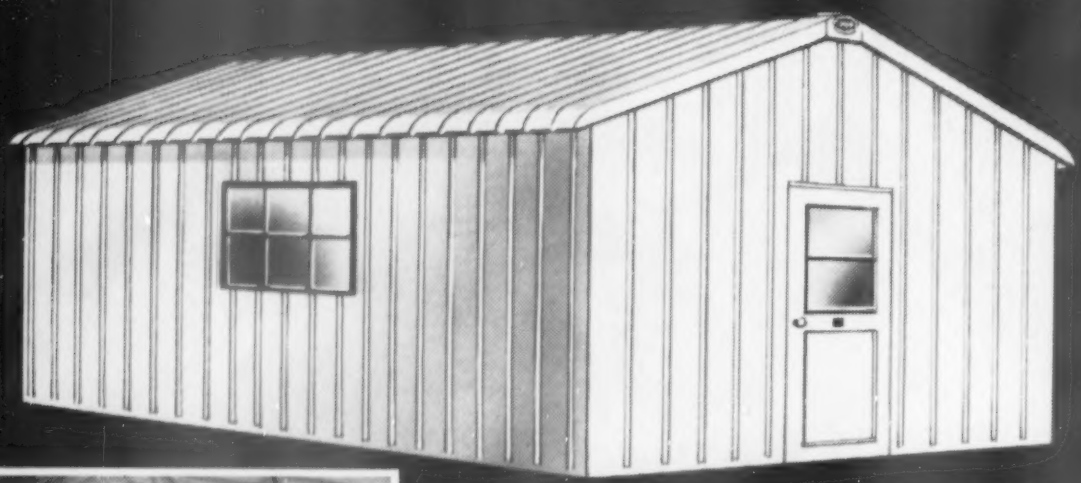

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4. Organizing and Scheduling Procedure For Fluid Cat Cracking Unit

by J. T. Tippit
The Texas Co., Port Arthur, Tex.

THE scheduling of maintenance manpower in the Port Arthur refinery of The Texas Co. is handled on a dual system, which includes a weekly and a daily schedule. This system allows for flexibility, and it has proved efficient since its initiation 3 years ago. Turnaround manpower is assigned by means of this dual system.

All turnaround work is planned and supervised by the test and inspection department. This department is headed by the test and inspection engineer; it includes an assistant test and inspection engineer, three job foremen, a material man, an equipment dispatcher, a head test and inspection foreman for each craft, and several subforemen in the larger crafts.

The test and inspection department has been in operation in our plant for only about 8 months, and is the result of an intensive study and a long-felt need for more uniform administration of turnaround work.

A meeting, entitled "Preliminary Meeting No. 1," is held approximately 6 months before the turnaround, and it serves as a formal starting point for the planning of the turnaround. The meeting is presided over by the plant superintendent, and those who attend include the following:

1. The superintendent of the manufacturing division.
2. The superintendent of the construction and maintenance division.
3. The chief power engineer and the power engineer to be assigned to the turnaround.
4. The chief engineer and the designing engineer assigned to the unit.
5. Representatives of the process-engineering group assigned to the unit.
6. The area supervisor and operating foreman concerned with the unit.
7. The chief inspector.
8. The test and inspection engineer.

Preceding this meeting letters are submitted, by all concerned, to the plant superintendent; and these letters suggest and outline desirable special work items. These items, along with the routine work lists submitted by the operating and inspection departments, are discussed at the meeting. Other items may be added; and all items, special or routine, are placed in one of three categories at this meeting. These three categories are: (1) approved, (2) disapproved, and (3) proposed.

Following the meeting, two lists are prepared by the engineering department, viz., one of approved items, and one of proposed items. Work is started on drawings, on material procurement, and on detailed planning on items on the approved list. Various investigations with respect to such matters as desirability, cost, and material availability, are also conducted on items on the proposed list.

The over-all planning of the turnaround is based on past records, and this planning is tempered by reason of new methods and equipment, and is fitted around the special jobs and the control jobs, whether special or routine. The control jobs are planned in detail from their inception to completion.

Craft manpower and equipment are assigned to these detailed plans for each shift throughout the job, and material

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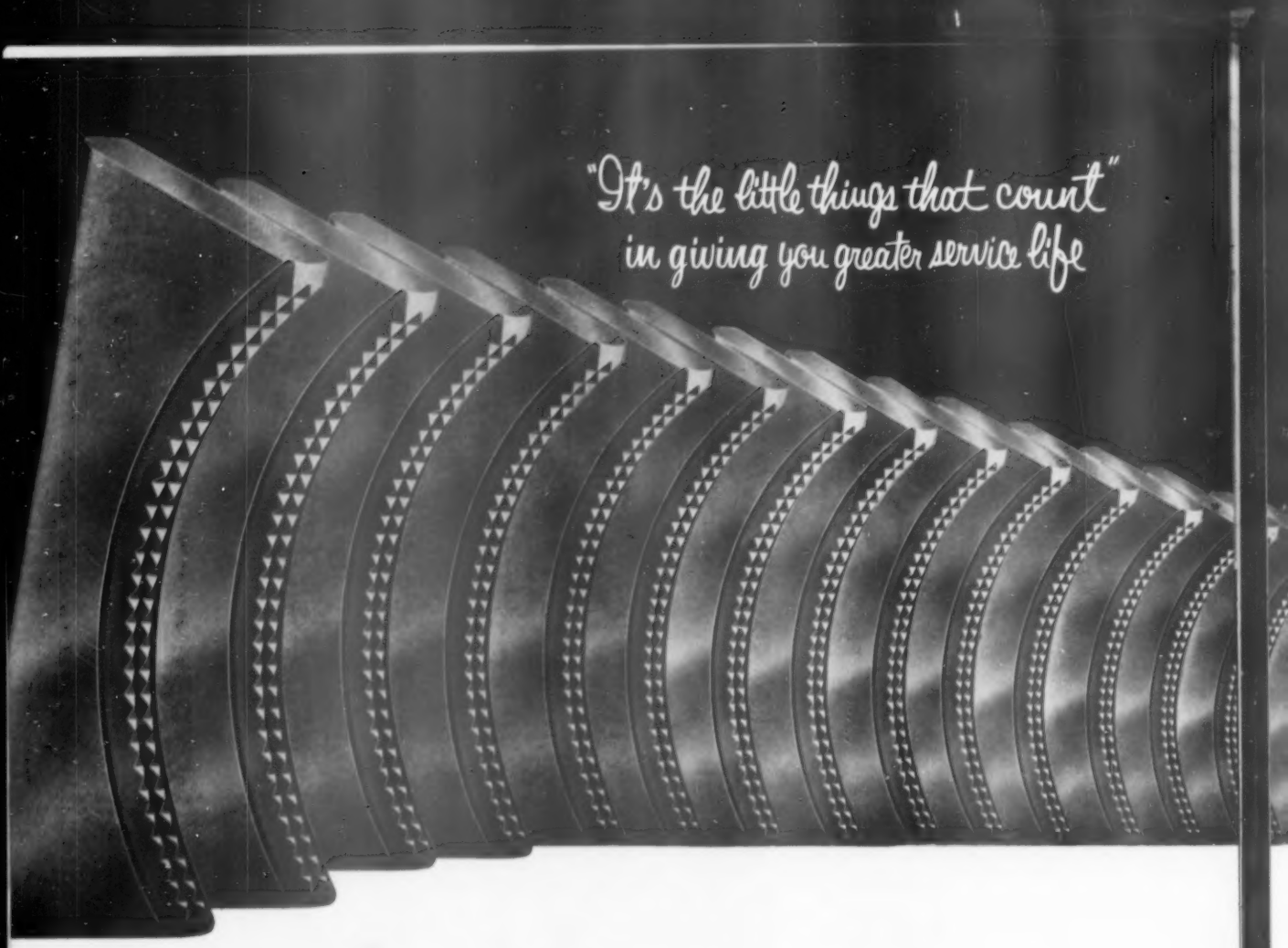

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procurement and movement are coordinated by the shift. Craft foremen are called into detailed planning sessions for their estimates on manpower and materials, and for their suggestions of methods. All of this planning is handled by the test and inspection engineer.

A second planning meeting is held approximately 2 months ahead of the turnaround starting date. This meeting is entitled "Preliminary Planning Meeting No. 2," and the attendance is the same as at "Preliminary Planning Meeting No. 1." Items placed on the "proposed list" at meeting No. 1 are discussed at meeting No. 2 and are either finally approved or rejected for the coming turnaround.

After meeting No. 2, the additional approved items are followed up by drawings and necessary material procurement, and are fitted into the over-all plan.

A master plan, with estimated manpower requirements for the entire test, is prepared by the test and inspection engineer, with the aid of all concerned, and detailed plans for control jobs are finalized.

Organization of Supervision

Approximately 2 weeks before shutdown time a meeting is called by the test and inspection engineer for the purpose of organizing the turnaround personnel, and of dispersing to that personnel the work outline for the turnaround. In attendance at this meeting are the following:

1. The engineers and job foremen who are to lead the work on the turnaround.
2. The test and inspection craft foremen of all crafts, and some of their subforemen, whenever deemed necessary.
3. The head operating foreman of the unit which is involved, and some of the unit stillmen.
4. The chief inspector and assistant.
5. The power engineer assigned to the turnaround.
6. The designing engineer assigned to the turnaround.
7. The truck and equipment dispatcher.
8. The material man.
9. The safety supervisors assigned to the job.

The shutdown plan is presented first, and a written outline is distributed to all concerned. This outline gives each step of the shutdown from the time the charge is cut until the unit is ready to work.

The routine work list for the turnaround is presented next. This list, prepared by the head operating foreman, includes routine work such as repairs to pumps, lines, and exchangers.

The list of special work items is presented next. This includes jobs for which blueprints or bills of material have been prepared by the engineering department.

The inspection department's requirements list is distributed and discussed.

The power department's work is outlined by the power engineer.

A general outline of the turnaround is presented by the test and inspection engineer who reviews the shutdown, and who ties the over-all work picture together and gives the expected downtime for the turnaround.

Certain on-the-job meetings are held for the clarification of details. For instance, the carpenter foreman, along with the other foremen involved, is conducted to each job so that he may understand the extent and type of scaffolding necessary for the performance of the required work. In addition to these special on-the-job meetings, each craft foreman is conducted over the entire unit by the test and inspection engineer, or job foreman, for a general on-the-job briefing.

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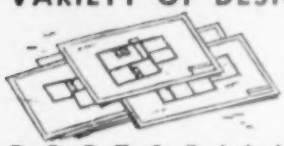

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is purchased from outside manufacturers must have delivery dates coordinated with the turnaround schedule, and material which is manufactured within the plant must be scheduled through the various plant shops in sufficient time to avoid any delays from that standpoint.

The work of scaffolding the unit usually makes up the largest part of the so-called preturnaround work. This work is considered carefully from the safety standpoint so that the hazards of scaffolding on an operating unit are held to a minimum. Each scaffold is individually considered by the test and inspection engineer and foremen and by the head operating foreman, and only those scaffolds considered as not hazardous to safe operation of the unit are constructed.

Other preparatory work on the unit includes the placement and partial rigging of steam hoists and air tuggers, the placement of temporary lines necessary to the shutdown, the cleaning of the service air and water lines, the checking of manway davits, the stringing of temporary lights, and necessary and possible layout work, the cleaning of drains, the marking of safety lanes, the placement of bicycle racks, the installation of temporary drinking-water fountains, the placement of portable material and tool trailers, and many others.

The Turnaround

On Wednesday of the week preceding the shutdown the test and inspection engineer submits a schedule to the supervisor of plans and coordination, which outlines the manpower requirements for each shift of the first week of the turnaround. These requirements have been collected from the shutdown plan, the general plan, and the detailed plans of control jobs, and they are a summarization of all.

The supervisor of plans and coordination, who controls the scheduling of construction and maintenance forces throughout the plant, then checks these requirements against other demands in the plant and approves manpower as nearly as possible to that which is requested. Turnaround manpower requirements are usually given priority over other plant manpower requests; and, for fluid catalytic cracking unit turnarounds, these requirements are met even at the expense of curtailing other work.

Two crafts are not included in the approved weekly schedule, viz., the masonry and the welding and cutting departments. The head foremen of these two departments are given, instead of the weekly schedule, general orders as to the number of men to be placed on each shift for the following week. These men are not assigned to any particular job on a weekly basis, but are estimated from the over-all weekly manpower requests, and are assigned by the daily schedule system exclusively.

From past experience it has been learned that it is not desirable to schedule these two crafts under the weekly schedule system, because need for this manpower is not consistent throughout the week.

Turnaround work . . . The unit is divided into two work sections, and an engineer or job foreman is placed in charge of the work in each section for the day shift. Craft subforemen, under the test and inspection craft foremen, are assigned to each work section as the amount of work of their craft in each section dictates. An engineer or job foreman is placed in charge of all work on the 3 p.m. to 11 p.m. shift, and also on the 11 p.m. to 7 a.m. shift, if work to be done during these periods is sufficient to warrant his presence. Craft subforemen are also assigned, as necessary, to the unit on these two offshifts so that they can direct the work

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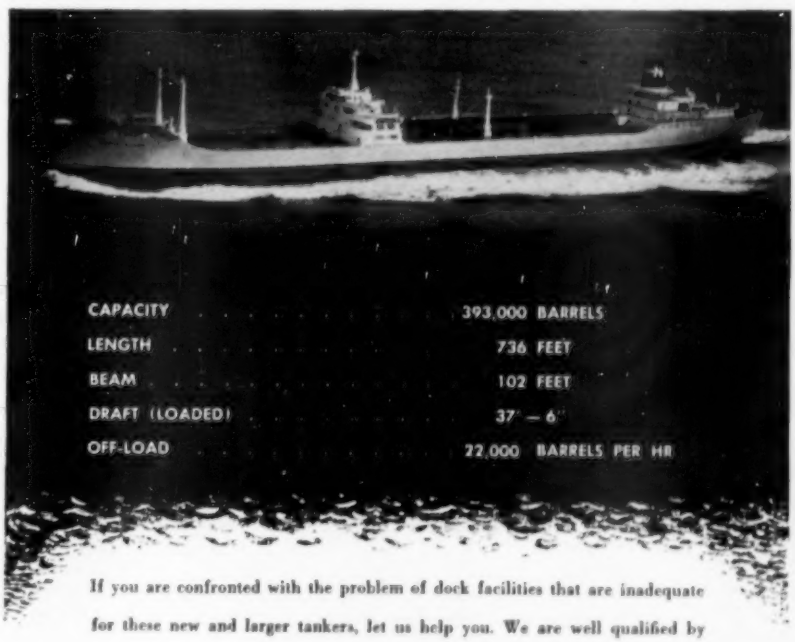

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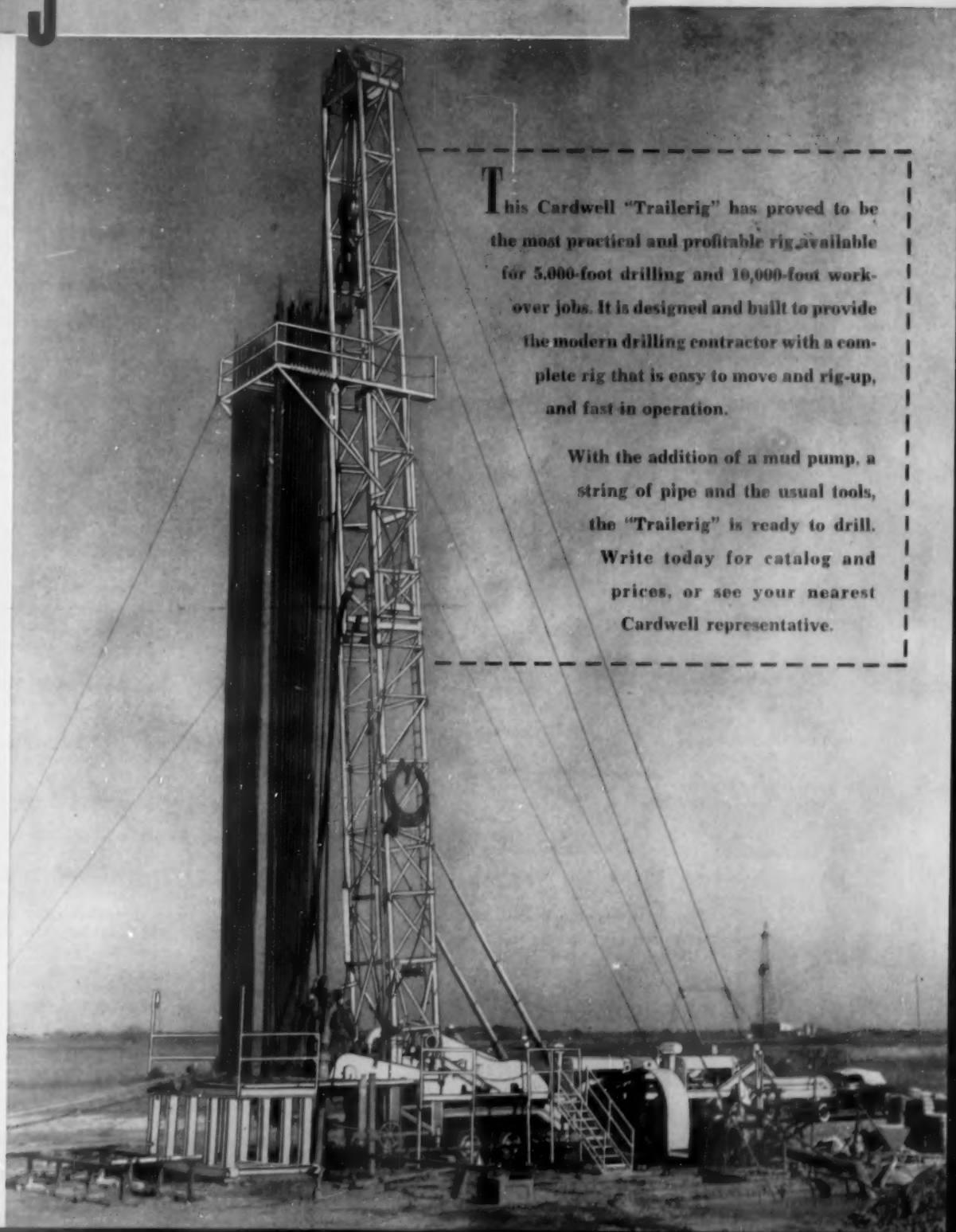

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The test and inspection engineer directs the work of the turnaround by means of the engineers and the job foremen assigned to the various work sections and by the test and inspection craft foremen. Each day, after schedules have been approved and the exact manpower has been determined for the next day, he calls in job foremen and engineers and, with them, writes out for each craft a detailed "assignment of work" sheet which covers the next 24-hour period. This period includes that day's 3-to-11 shift, the following 11-to-7 shift, and the next day's shift.

"Turnaround planning gets closer to home when . . . the design gets under way; when the over-all layout is agreed upon; when heaters, machinery, controls, and gaskets are selected."

Other work of a preventive-maintenance nature may be added to the work lists as conditions of equipment on the unit indicate. An example of this type of work may be the installation of "hexsteel gunite" liners at points which indicate excessive wear. Decisions on this type of work are usually made jointly by the chief inspector and the test and inspection engineer.

As the turnaround progresses, unexpected work of considerable magnitude may be revealed by inspection. When this work arises, it may be necessary to alter other work plans or actually delete entirely from the work lists some other desirable, but not absolutely necessary, work in order to make manpower available for this unexpected work. Practical records of conditions noted during previous turnarounds tend to hold to the minimum this unexpected work.

Records of the condition of various equipment—such as line and tube thicknesses, vessel thickness, and other items which affect the safety of operations of the unit—are kept up to date by entries at each turnaround by the inspection department. From these records replacements necessary at future turnarounds can be predicted with accuracy.

Other valuable records are kept by the test and inspection department. These records include such items as total manpower and special and repetitive job manpower, condition of equipment and forecast of work which should be done on this equipment at the next turnaround, and a general record of all work of consequence performed during this turnaround.

Postturnaround . . . All supervisors who took part in the work of the turnaround are called together shortly after the completion of the turnaround so that they can participate in this postturnaround meeting. The main purpose of this meeting is to improve the future turnarounds, and it is during such meetings that perhaps the most important improvements in turnaround work are recognized and initiated.

Each man present is given an opportunity to give his views as to which parts of the work went well, or did not go well, and the reasons why. He may suggest changes in methods or tools, material, or equipment used to speed up or to make work more efficient. He may also call attention to material shortages and certain materials or equipment which may need replacement at the next turnaround.

Records are kept of this meeting, and the many accepted suggestions which are received here are incorporated into the plans of future turnarounds.

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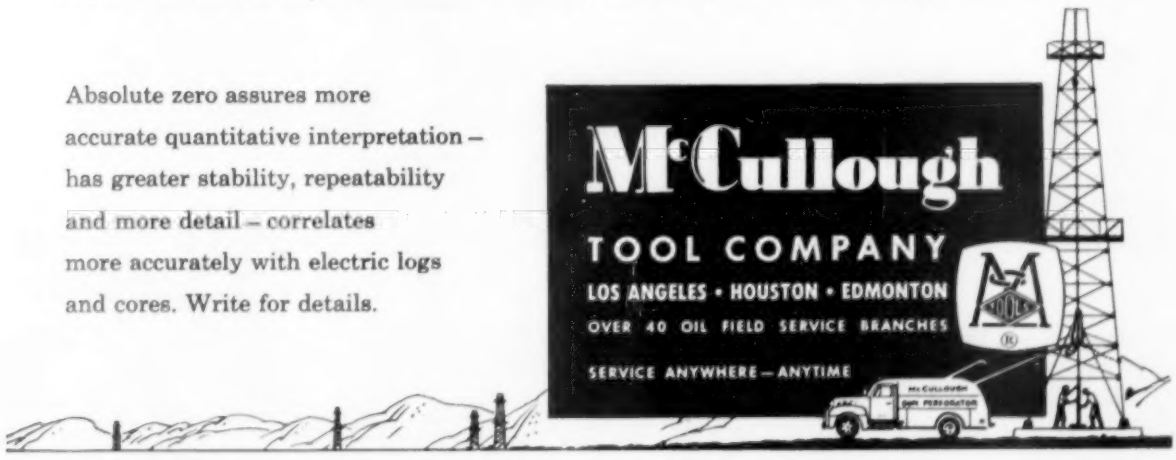

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by W. L. Nelson
Technical Editor

QUESTIONS ON TECHNOLOGY

Effect of Sulfur on Value of Residual Fuel Oil

"How much does sulfur reduce the usefulness of a fuel oil?" S.G.N.

Very-low-sulfur (under 1 per cent) fuel oil has since 1951 sold at New York Harbor at about 5.5 per cent above the price of "No Sulfur Guarantee" fuel oil. This premium (12-13 cents per barrel) cannot be justified by the usual considerations of loss of heating value due to sulfur, or to difficulties with corrosion in the economizers or air preheaters of boilers; and accordingly it must be ascribed mainly to the use of such fuels for metallurgical purposes where sulfur would contaminate the metal product.

Fuel oils that contain 2 or more per cent sulfur are the usual thing, and these are not penalized because of their high sulfur content. However, high sulfur does reduce the heating value of the fuel by 0.74—0.88 per cent for each 1.0 per cent sulfur. In addition, higher cold end temperatures must be used in air preheaters and economizers as indicated in Fig. 1 (Southern Power & Industry, February 1953, p. 96, and a somewhat similar analysis, *(The Oil and Gas Journal, December 22, 1952, p. 353)*. Inasmuch as an increase in the flue gas stack temperature of 38°-40° F. causes a loss of thermal efficiency of 1.0 per cent, the effect of high sulfur is somewhat as indicated in Table 1.

The reader must be reminded again that the loss in usefulness indicated in Table 1 seldom results in a reduction in price when purchasing fuel oils.

TABLE 1—APPROXIMATE REDUCTION IN THE USEFULNESS OF A FUEL OIL DUE TO A LARGE PERCENTAGE OF SULFUR, PER CENT

Per cent sulfur	Percentage decrease due to corrosion loss of heating value: Power plant boilers	Other high-temp. furnaces	Average
2.0	(*)	(*)	(*)
3.0	1.8	0.8	1.3
4.0	3.1	1.55	2.4
5.0	3.5	2.25	2.9
6.0	3.8	2.90	3.4

*Customary.

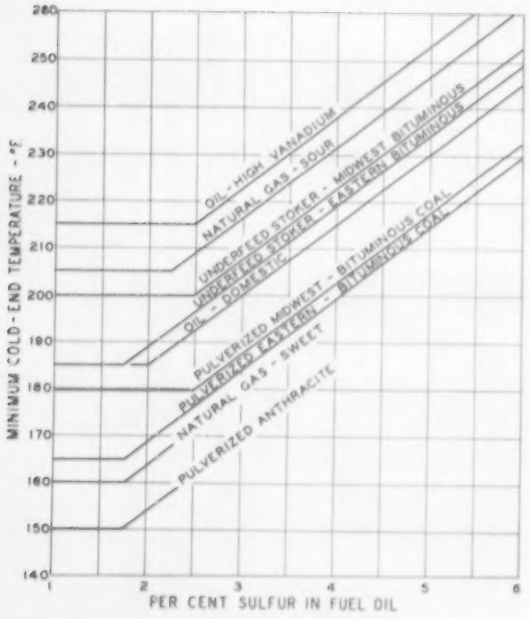
MINIMUM COLD-END TEMPERATURE - °F
PER CENT SULFUR IN FUEL OIL
OIL - HIGH VANADIUM
NATURAL GAS - SOUR
UNDERFEED STOKER - MIDWEST BITUMINOUS
UNDERFEED STOKER - EASTERN BITUMINOUS
OIL - DOMESTIC
PULVERIZED MIDWEST - BITUMINOUS COAL
PULVERIZED EASTERN - BITUMINOUS COAL
NATURAL GAS - SWEET
PULVERIZED ANTHRACITE

Fig. 1—Recommended minimum cold end temperatures for power-plant air preheaters.

Cost of Oil-Handling Versus Coal-Handling Systems

"Are large power plants which operate on fuel oil cheaper to install than plants which operate on coal?"—M. C. P.

Although gas-firing or oil-firing equipment is cheaper than coal-firing equipment, the effect on the total plant cost is so small that one can scarcely distinguish between oil-firing and coal-firing plants. Gas-fired plants are definitely cheaper because no provision whatever for storage of fuel is necessary. Most generally, the gas-fired plants are cheaper to the extent of about $15 per kilowatt of capacity. This figure was obtained from the installation costs of complete power plants published in Engineering News Record, October 8, 1953, page 151, which on a basis of dollars per kilowatt is about:

Gas fired	$135
Coal or oil fired	150
Dual firing—both coal and gas	158

These are most approximate costs because so many factors such as capacity, whether built inside or outside, etc., were involved that even though data on about 42 recent plants were available, it was impossible to see clearly the effect of various kinds of firing, on the total installation cost. Incidentally, outdoors plants appear to cost about $34 less per kilowatt than conventional indoors plants. Most sources of information fail to distinguish between various means of firing.

Much the same is indicated by the detailed cost studies of May 25, 1953 (page 265), and June 8, 1953 (page 141), of the Questions on Technology page. Table 1 shows the results of these two studies. Small oil installations are expensive because of the necessity of storage tanks whereas coal can be piled on the ground at the smallest coal installations. Note, however, that the cost of labor in small coal installations will be very high.

TABLE 1—APPROXIMATE COSTS OF OIL* AND OF COAL† HANDLING SYSTEMS

Capacity: Tons coal per year equivalent	Capacity: Bbl. oil per year	Installation cost: Oil handling*	Installation cost: Coal handling†
300	1,240	$2,670	$800
1,500-2,000	6,200-8,300	4,980	800-3,700
5,000	20,600	11,100	1,200-5,000
6,000	24,700	12,300	15,000
9,000	37,000	15,800	30,000
12,000	49,300	18,500	36,000
15,000	61,800	21,150	45,000
30,000	124,000	31,800	65,000

*As shown in the issue of June 8, 1953, but the storage time for oil fuel reduced to 30 days. †Includes ash handling but not the cost of stokers or pulverizers. A stoker system more than doubles the cost.

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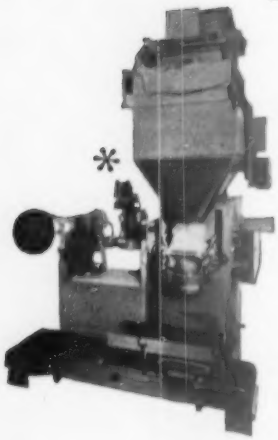

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Sampling for Continuous Analysis—4

by C. G. Fellows

A SECOND interesting sampling system was that required to provide a sample of the tails liquid of a chemical process so that it could be continuously analyzed for its per cent-by-weight lime content over the range of 0 to 0.5 per cent and to a reproducibility of ±0.02 per cent.

The sample was a mixture consisting of water, lime, sand, and a small amount of a gummy white substance. It was opaque and flowed at a controlled temperature of 80° C. Several methods of both sampling and measurement were attempted, the ones described herein proving to be successful. The sampling and the measurement are so intermixed that both will have to be described.

Measurement . . . CO_2 gas is bubbled into a cold-water stream, both flowing at a fixed rate. This CO_2 charged water is then heated to about 40° C. so that its CO_2 content remains essentially constant. This warm water and the hot sample are mixed in the ratio of three parts water to one part sample and the mixture temperature is controlled at about 50° C. ± 1° by controlling the water temperature.

At this controlled temperature, the lime reacts with the CO_2 to form calcium carbonate which precipitates and is drained away. A continuous sample of the liquid after reaction is measured for the change in its CO_2 content. This change is calibrated as the weight per cent of lime in the tails liquid. The details of the measurement will be unfolded with the discussion of the sampling system.

Sampling system . . . If a sample of this liquid is allowed to stand for about 5 minutes, it would be noted that about a third of it was sand, followed by a layer about ⅛ in. thick of the white gummy substance and the remainder being a fairly clear mixture of the water and lime. As the development of the sampling system progressed, it was found that the sand for the most part had to be removed and that the gummy substance coated metal surfaces which included the flow orifices so that an automatic orifice-cleanout system had to be devised.

The final design is shown in Fig. 3. It consists of a sheet Bakelite tank divided into three weir sections. From left to right, they are the water weir, the mix weir, and the tails-liquid weir. The tails liquid enters through the inlet and passes into the weir by flowing through a ¾-in. high by 10-in. long gap at the bottom of baffle plate. Most of the sand, and 70 per cent of the liquid flow into a drain via the orifice through which cleanout plunger A is seen to extend.

The remaining 30 per cent rises in the weir and most of it overflows into a drain via the slot at the top of the weir. This slot is about 9 in. wide by 1 in. high, and the height of the overflow liquid remains essentially constant at about ⅛ in. above the overflow-slot edge. Thus a constant liquid head of about 7 in. is provided for the tails-feed orifice into which cleanout plunger is seen to extend. In a similar manner, a constant flow of CO_2 charged water is admitted into the mix weir via the orifice.

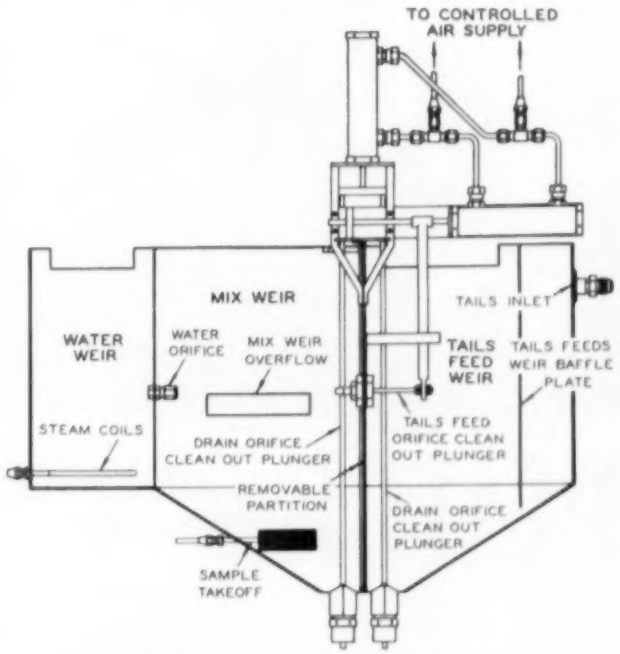

Fig. 3—Multiple-weir assembly for lime in tails analyzer.

Author is with Carbide and Carbon Chemicals Co., South Charleston, W. Va., in special instrumentation department. Paper presented at 1954 Texas A. & M. instrumentation symposium.

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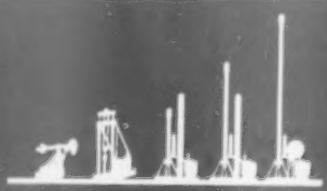

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How to Design In-Tank Jet Mixing Systems—2

ANOTHER mixing technique has been investigated by H. Fossett and L. E. Prosser and has proved satisfactory. Results of this investigation have been published in England.

This new technique involves the use of free jets in agitating the contents of large gasoline blending tanks. In this technique, gasoline is circulated as shown in Fig. 1 (Installment No. 1) except that instead of discharging into the side of the tank or through a swing line or spider, a jet nozzle is used. The jet of gasoline discharging into the tank at high velocity induces circulation of the entire contents of the tank with a top-to-bottom turnover and without rotational swirl. The circulation pattern established by a jet system is somewhat similar to that established by propeller mixers, and the resulting mixing is rapid and efficient. (See Fig. 2).

Advantages . . . The jet mixing system usually has the advantages of the low installation cost of the old recirculation system and the high efficiency of the propeller mixing system. Power requirements for the system are usually low, mixing time is relatively short, and therefore tank utilization is good. Required pump capacities are lower than for the straight recirculation system although the required head is higher; piping and pumps are in use less time than in the straight recirculation system and their utilization can be increased. The cost of installing jet nozzles in the tank is low compared to swing lines or spiders, and exceedingly low as compared to propeller mixers.

Such jet mixers have been installed in tanks in England and the United States. The design theory has been proven in the field. Due to the satisfactory dollar-saving performance of this in-tank jet mixing system, it can well be considered for future facilities and for improving existing installations.

Of primary importance to refinery and terminal management is the installation and operation of the most economical satisfactory blending system. This section reviews some of the economic factors which should be considered before constructing new facilities or modernizing or expanding existing facilities for blending TEL with gasoline.

Facilities for TEL addition . . . For an economic evaluation, a blending system should be separated into two parts. The first part, which is usually used only for the addition of TEL, consists of: the eductor pump; the piping between the eductor pump, eductor, and the main circulating piping; and the blending plant itself. For comparing the economics of the various methods of mixing gasoline in tanks, variations in this part of the system are usually not considered because the system would probably be the same for each of the alternative methods. The exception to this rule is that sometimes a higher-pressure eductor pump is necessary for the in-tank jet installation when the discharge pressure to the blending tank is high.

Facilities for tank agitation . . . The second part of the blending system consists of the tanks where the gasoline is mixed, the means for mixing in these tanks, the main circulating piping to and from these tanks, and the main circulating pump. This part of the system is frequently used for other things. The tanks can be used for storage or rundown and the piping can be used for filling and emptying these tanks as well as others. The main circulating pumps are frequently used for loading or unloading ships or barges, pumping to pipelines, or pumping to or from many tanks in a tank farm. Since this part of the blending system is used for many other purposes, the requirements may also be determined by these other uses. For example, a 3,000-g.p.m. pump required for barge loading could be used for circulating though only a 500-g.p.m. pump is required.

In comparing different mixing methods to determine the most economic technique, the minimum requirements of the tank, pump, and piping system from other aspects should be developed. Using this as a basis, the additional costs of installation for the different blending systems may be determined and an evaluation made of the operating savings and operating advantages to be gained from each system.

Some examples and design sheets and charts will be presented in installments to come.

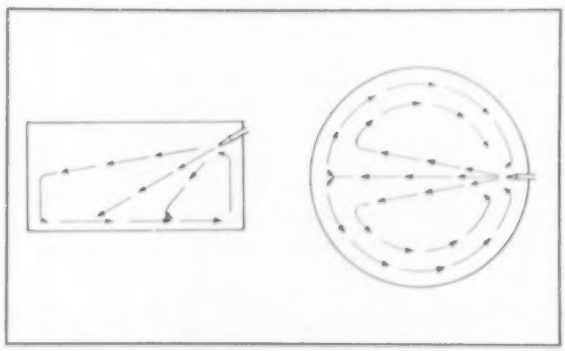

Fig. 2—Induced circulation for an in-tank jet.

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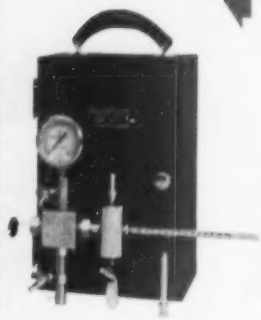

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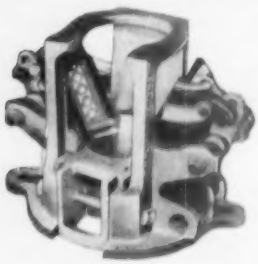

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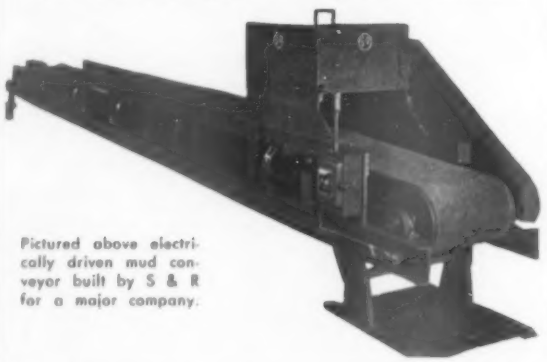

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Fluid Displacement in Linear Floods — 6

East Texas Field Proves Muskat Theory

by Dr. R. F. Nielsen

EAST TEXAS field offers an excellent example of a field in which the energy for production has been supplied almost entirely by expansion of an adjacent aquifer. Production has been controlled so that pressure has remained above the bubble point of the oil. Flow of water into the field approximates an arc of a radial system (Fig. 1), and sand thickness, permeability, porosity, and fluid properties "average out" so that the equations of plane radial flow are applicable.

General equations for plane radial flow of compressible liquid in a porous medium were derived by Muskat.[1] He used these to show that the observed-pressure history of East Texas field was in accordance with the above theory. Hurst and Van Everdingen[2] derived similar equations by a different technique. Methods based on these tables have been described, with examples, in this journal.[3]

The following calculation shows the application of the H. and v. E. tables to the pressure history of East Texas field. The constants have been taken from Muskat, as has production history and observed field pressure. The aquifer is taken as a circular sector of 120°, with an outer radius $r_e = 100$ miles and an inner radius $r_w = 20$ miles. The calculation assumes that the volume (at reservoir conditions) of produced fluids must equal the flow of water over the 120° arc of 20 miles radius.

Production given by Muskat as a series of constant rates, each over a given time period, is given in Table 1. It includes opening of the field up to 950 days, this being sufficient for illustration. This method of superposition must be used. That is, the initial rate of 370,000 bbl. per day is assumed to be maintained the entire 950 days, but an additional rate of 640,000 − 370,000 = 270,000 is superposed after 90 days, for the remaining 860 days.

A negative rate of 640,000 is superposed at 135 days, bringing the production to zero. The superposed rate, ΔQ, is applied at the time given by the first figure of the first column, and is continued from then on.

H. and v. E. employ "reduced" quantities, to avoid carrying cumbersome constants in the equations. The "reduced time" **t** is:

$$\mathbf{t} = Kt/f\mu c r_w^2 \qquad (1)$$

where K may be taken as the permeability in perms (6.33 times the permeability in darcies), t is time in days, f is porosity as a fraction, μ is viscosity in cp., c is compressibility in psi.$^{-1}$, and r_w is radius of the internal boundary in feet. From Muskat, $r_w = 20 \times 5{,}280 = 105{,}600$, $K/\mu = 2.12 \times 6.33 = 13.4$, $c = 5.3 \times 10^{-4}/14.7 = 3.6 \times 10^{-5}$, and $f = 0.2$. Thus $\mathbf{t} = 1.67 \times 10^{-4}$ t. Muskat found it necessary to take c much higher than that of water, and he attributed this high compressibility to a gas phase in the pores of the aquifer.

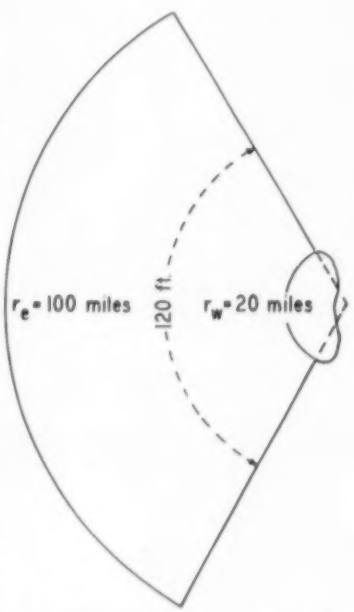


Fig. 1—Assumed dimensions of aquifer driving the East Texas field.

The H. and v. E. tables give a "reduced" pressure drop $\Delta\mathbf{p}$ as a function of **t**, due to a constant flux q over the inner boundary. This is defined by:

$$\Delta\mathbf{p} = \frac{2\pi Kh\,\Delta p}{q\mu} \qquad (2)$$

where h is sand thickness in feet, Δp is pressure drop in psi. due to flux q, q is flux in reservoir cubic feet per day, and other symbols as above. Since q applies to a complete circle, instead of 120°, the ΔQ values of Table 1 must be multiplied by 3. They must also be converted to reservoir cubic feet, assuming a formation-volume factor of 1.18. Hence Column 4 gives $q = \Delta Q \times 1.18 \times 5.61 \times 3 = 19.9\,\Delta Q$.

TABLE 1—PRODUCTION FROM EAST TEXAS FIELD

t days	Q, M bbl./day	$\Delta Q \times 10^{-3}$	$q \times 10^{-3}$	q/10,940
0- 90	370	370	7,363	673
90-135	640	270	5,373	491
135-165	0	—640	—12,736	—1,164
165-625	370	370	7,363	673
625-640	0	—370	—7,363	—673
640-700	355	355	7,065	646
700-730	600	245	4,875	445
730-755	0	—600	11,940	—1,090
755-820	1,000	1,000	19,900	1,820
820-950	515	—485	—9,651	—882

Systematic calculation of the pressure-drop history is deferred to the next installment of this series. Values of $\Delta\mathbf{p}$, taken from the tables of H. and v. E. for given values of **t**, must be converted to actual pressure drops by Equation 2. Pressure drop in psi. due to each superposed q is:

$$\Delta p = \frac{\Delta\mathbf{p}\,q\mu}{2\pi Kh} = \frac{q\,\Delta\mathbf{p}}{2\pi \times 13.4 \times 130}$$

$$= \Delta\mathbf{p}q/10{,}940 \qquad (3)$$

References

1. Muskat, Flow of Fluid in Porous Media, 1937.

2. Hurst and van Everdingen, Pet. Tech., A.I.M.E., 1949, p. 305.

3. Nielsen, Unsteady State Flow of Compressible Fluids, The Oil and Gas Journal, July 26, 1954.

Author is associate professor, petroleum and natural-gas engineering, Pennsylvania State College.

ELECTRIC LOGGING—38

Causes of Direction Changes in the S.P. Curve

by R. I. Martin

WHEN the bed resistances are small compared with the resistances in the mud column, practically all the potential drop is produced in the mud. The total deflection on the S.P. log then becomes nearly equal to the static S.P. This is illustrated by a single permeable bed where the resistance in the rock is 10 ohms compared with 200 ohms in the mud column.

When, howver, the bed resistance represents a large part of the total resistance, the deflections on the S.P. log cannot reach such high values.

All along the bore hole opposite a given hard formation, the current in the mud column remains substantially the same. Therefore, the drop in potential per unit length is fairly constant, thus giving a constant slope to the S.P. curve.

At the level of each conductive bed, some S.P. current enters or leaves the hole. The slope of the S.P. log is therefore modified. In the case of an isolated permeable bed the slope changes direction. This is because the current flow also changes in direction. Such a bed is easy to recognize, but the difficult is to determine the boundaries, precisely. It may be noted that the resistivity curve obtained with the limestone device is helpful in this respect.

Where several permeable beds are present, the diagnosis is not so clear at first sight. For the upper permeable bed in the lower part of Fig. 1 of the previous installment, the S.P. curve changes in slope but not in direction. At this point the S.P. current changes in volume, but not in direction. Here again, the bed thickness cannot be determined from the S.P. curve.

In the center permeable bed of the lower limestone, a change in the direction of the S.P. currents takes place. As a result, the S.P. curve changes in direction, although the amount of curvature is small.

These characteristics of the S.P. curve which are used for the location of permeable zones, and also the effects of thin interbedded shale, are shown in Fig. 1. The resistivity of the respective layers is indicated by a curve taken with the limestone device. Unless the resistivity of the mud is extremely low, it is usually possible to recognize such features.

So far it has been assumed that the limestone as a whole is impermeable. It is now supposed that the rock has an extremely low permeability and the resulting effects will be considered.

As long as the formations are somewhat conductive, current passes from the mud into the formation at all levels where the static S.P. is more negative than the actual S.P. in the mud. The current loss per foot of hole is proportional to the difference between the static S.P. and the actual S.P., and also to the conductivity of the formation. This results in a progressive change in the slope of the S.P. curve, which shows as a convexity towards the negative side.

Conversely, wherever the static S.P. is more positive than the actual S.P. in the mud, current flows into the mud, so that the S.P. curve becomes convex towards the positive side.

Both these types of curvature are noticed in the field although the former, rounded curves which convex towards the negative side, are more common.

Although the foregoing rules for the interpretation of limestone logs may be applied with successful results in many cases, there are many other cases, however, where logs are by no means easy to interpret. As a result of this difficulty, new developments have taken place in both resistivity and S.P. measurements.

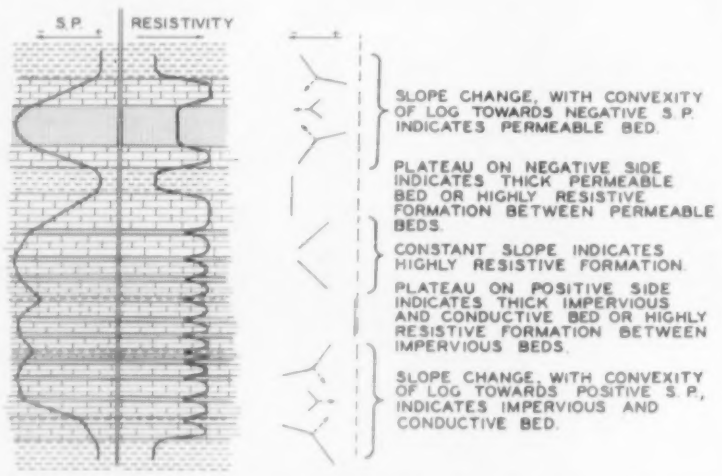
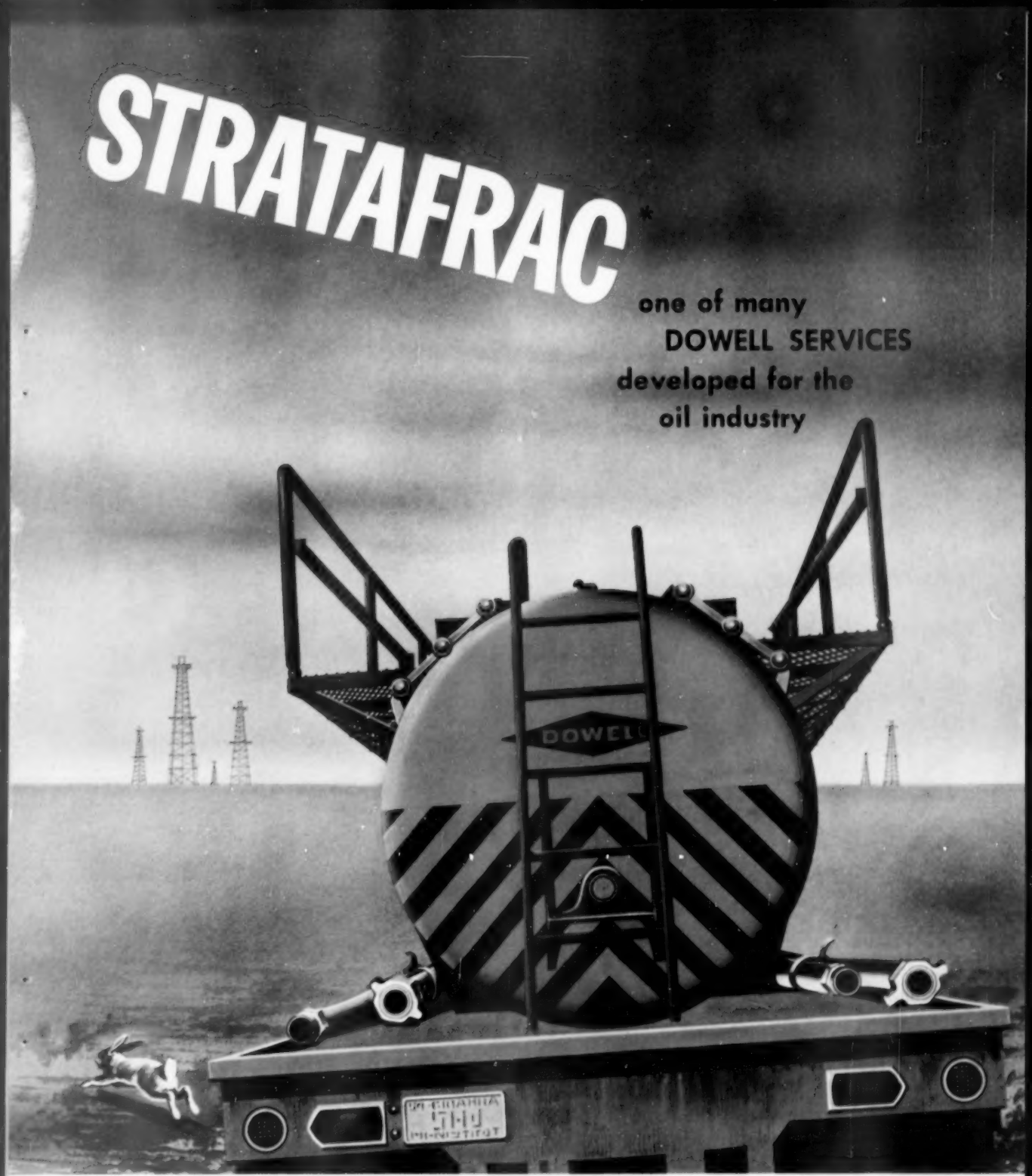

S.P.
RESISTIVITY
SLOPE CHANGE, WITH CONVEXITY OF LOG TOWARDS NEGATIVE S.P. INDICATES PERMEABLE BED.
PLATEAU ON NEGATIVE SIDE INDICATES THICK PERMEABLE BED OR HIGHLY RESISTIVE FORMATION BETWEEN PERMEABLE BEDS.
CONSTANT SLOPE INDICATES HIGHLY RESISTIVE FORMATION.
PLATEAU ON POSITIVE SIDE INDICATES THICK IMPERVIOUS AND CONDUCTIVE BED OR HIGHLY RESISTIVE FORMATION BETWEEN IMPERVIOUS BEDS.
SLOPE CHANGE, WITH CONVEXITY OF LOG TOWARDS POSITIVE S.P., INDICATES IMPERVIOUS AND CONDUCTIVE BED.

Fig. 1—Interpretation of S.P. logs. From Doll, "The S.P. Log: Theoretical Analysis and Principles of Interpretation," A.I.M.E., P.T., September 1948.

Author is assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy.



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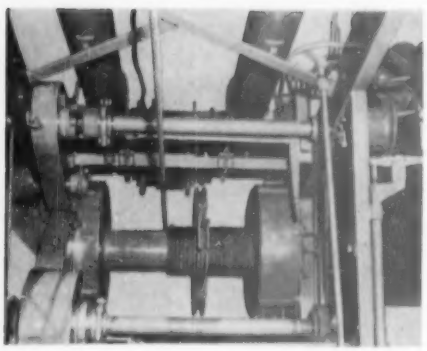

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How Mud Pressures Affect Drilling Rate

by H. B. Woods

THE use of air or natural gas as a flushing fluid is increasing, because in some cases the increases in drilling rate obtained with gas or air as compared to water or mud are phenomenal. Laboratory tests have already demonstrated that these increases were at least partly due to the removal of hydrostatic pressure from the bottom of the hole. Roy A. Bobo and H. M. Barrett[1] reported on the use of mixtures of mud and air to combat lost-circulation problems and to obtain at least some of the increases in drilling rate and bit life experienced with air or gas alone without the very serious limitation that air or gas alone cannot be used when water flows are encountered.

On newly constructed laboratory apparatus, it is now possible to drill holes in rock samples with a 1¼-in. diameter rock bit with the rock subjected to any desired hydrostatic pressure up to 10,000 psi. The test consists of drilling with a constant rotary speed and weight on bit and successively vary the hydrostatic pressure on the formation from zero to some maximum value of the order of 5,000-10,000 psi.

Although this work has not been under way long enough to be considered final, in a general way, we find that the drilling rate is a maximum at zero hydrostatic pressure. It drops quite rapidly with a slight increase in hydrostatic pressure and then more slowly as pressure continues to increase.

The magnitude of the drop in drilling rate with increase in hydrostatic pressure varies with different rocks. Two extreme situations are shown in Fig. 1. An increase in the pressure surrounding the rocks from atmospheric to 2,500 psi. reduced the drilling rate in the soft shale by 90 per cent and in the basalt by only 30 per cent.

These tests do not exactly duplicate the conditions that exist in the hole bottom. In this case we are subjecting the whole core including the hole bottom to a constant pressure. In actual drilling, the rock in the vicinity of the hole bottom is subjected to a pressure due to the weight of over-burden which is roughly equal to 1 psi. per ft. of depth. The hole bottom is subjected to a pressure due to the weight of fluid above it which is about ½ psi. per ft. of depth if mud is used or not more than a few atmospheres pressure if air is used.

Work by geophysicists through the years have established that at high hydrostatic pressures (hundreds of thousands of pounds per square inch) rocks become stronger and lose their brittle properties. Our work has established that even at the much lower pressures existing at the bottom of an oil well, the changes in properties are appreciable. John Eckel[2] reported on the effect of mud properties on drilling, and additional studies are being conducted by several research groups.

In studying the effects of mud properties on rock-bit bearing life, we have found that bearing life may be one half as great in one mud as in another. It has also been established that certain ingredients when added to a good mud (a mud that gives about the same bearing life as water) greatly decreases the bearing life. It is interesting that the detrimental effects of some of these materials can be partially neutralized by the addition of very finely pulverized sand. Let it be understood that I am not suggesting that you dump sand in your drilling mud.

Author is with Hughes Tool Co., Houston.

References

1. Aeration of Drilling Fluids by Roy A. Bobo and H. M. Barrett, World Oil, September 1953, Vol. 137, No. 4, page 145.

2. Effect of Mud Properties on Drilling Rate by John R. Eckel, The Oil and Gas Journal, April 12, 1954, Vol. 52, No. 49, page 131.

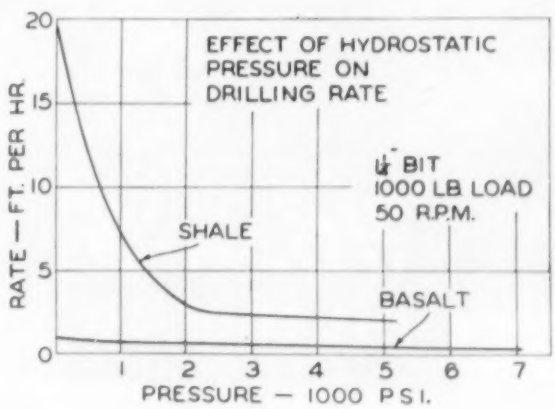

Fig. 1.

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Drilling Contractors

Hadden Farmer Drilling Co. is drilling on a 4,700-ft. contract it has with Arcadia Refining Co. and Cascade Petroleum Co., of Tyler, at 1 Mislivets, a Woodbine wildcat test 6 miles southwest of Wills Point, in Van Zandt County, Texas. Location is in the I. Killough Survey.

Delta Drilling Co., Tyler, Tex., is on a new wildcat operation 3 miles south of Malakoff, in Henderson County, East Texas. It is drilling for Westbrook Oil Corp. Location is for 1 Cousins, in the John Albright Survey.

Woolf & Magee, Tyler, Tex., will drill a Travis Peak test for R. W. Fair, also of Tyler, in Redland field, northern Bossier Parish, North Louisiana. The test, 1 Goodwin, in 28-23n-12w, is more than a mile from nearest Travis Peak production, and about ½ mile from other production. Contract is for 7,500 ft.

Fortenberry Drilling Co., Natchez, Miss., and **Penrod Drilling Co.,** Shreveport, are contractors on two wells being started in Horseshoe field, a new Wilcox producing area in Concordia Parish, eastern Louisiana. Fortenberry is drilling for Calto Oil Co. at 1 King, in 1-6n-7e. Penrod is working for Hunt Oil Co. at 3 Dale, in 6-6n-8e. The first location is a quarter mile southwest, and the other a quarter mile east of the field's newly completed second producer, D. E. Vasser 2 King, north offset to the discovery well. The field's present pay zone is around 5,300 ft. Penrod's contract is for 7,000 ft.

Glasscock Drilling Co., Shreveport, has another deep test under way for M. H. Marr, of Dallas, in Phoenix Lake field, western Calcasieu Parish, Louisiana Gulf Coast. The new operation, 1 Odem, in 21-11s-13w, offsets the operator's recently completed initial well in the field which opened a new deeper pay zone. Contract is for 9,000 ft.

Baker-Taylor Drilling Co., Amarillo, Tex., has a contract with Sinclair Oil & Gas Co. for a 6,700-ft. test to be drilled a mile southwest of Colorado Oil & Gas Co.'s recently completed Atoka gas-discovery well, 10 miles north of Spearman, in northeastern Hansford County, Texas Panhandle. The new operation is 1-C Steele, in Section 55, Block 45, H&TC Survey.

Midwestern Drillers, Tulsa and Liberal, Kans., is starting the first of two Purdy sands wells it has contracted to drill for Shell Oil Co. in the Keyes district, in Texas and Cimarron counties, Oklahoma Panhandle. The first well, 1 Williams, in 30-5n-10eCM, is

On the floor of the rig operated by Moran Drilling Co., Wichita Falls, Tex., which drilled Phillips Petroleum Co.'s new oil-discovery well, 1 Delp, 15 miles northeast of Pampa, in Gray County, Texas Panhandle. Left to right: Jack Bendler, Phillips engineer; Thomas McBride, Baker Oil Tools, Inc.; Gene Alleman, tool pusher for the contractor; and Mutt McKinnley, cementer, Halliburton Oil Well Cementing Co. The well, still testing, is producing from Pennsylvanian granite wash at 9,548-65 ft.

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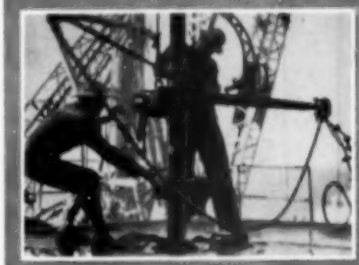

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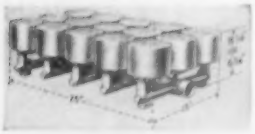

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on the Texas County side of the line. Location for the second well, 2 Williams, in 25-5n-9eCM, is ½ mile to the west, in Cimarron County. Purdy sand, productive of oil around 4,400 ft., is encountered about 400 ft. above the original Keyes district gas sand.

T. M. Pruett will be contractor on a new wildcat operation J. M. Roberts, of Shreveport, and Roy Powers, of Kokomo, Ind., have projected for Sangamon County, Illinois. Location is in 25-14n-5w.

R. B. Well Service Co. is scheduled for a 6,450-ft. test to be drilled for Union Oil Co. of California at a wildcat location a mile south of production on Vinton dome, in Calcasieu Parish, Louisiana Gulf Coast. Location is for 1-J Gray, in 5-11s-12w.

Crescent Drilling Co., Inc., Monroe, La., is starting another Smackover test for Republic Natural Gas Co. in Colquitt field, Claiborne Parish, North Louisiana. The test, 1 Glass unit, in 27-23n-6w, offsets to the north Republic's discovery well of the new deep pay zone.

Smackover Drilling Co. is drilling a 1,750-ft. Meakin wildcat in northern Ouachita County, Arkansas, on a contract with George Belchic, Jr., of Shreveport. Location at 1 Camden, in 13-12s-18w, is 3 miles northeast of Lester.

Circle Drilling Co., Lake Charles, La., will drill a 12,000-ft. test for Vincent & Welch, Inc., also of Lake Charles, at a wildcat location, 1 Lutcher Stark, in 20-14s-9w, a mile north of the Cameron multipay gas-distillate field, Cameron Parish, coastal Louisiana.

Dorris Ballew, Inc., Natchez, Miss., as a contract operation under way in the new Clayton field, in Concordia Parish, eastern Louisiana. It is for R. A. Campbell, of Vidalia, La., who is offsetting to the north the field's second producer now being completed. Location, 1 Campbell-Fomby, is about 1,400 ft. northeast of the discovery well Billups and Gauthier & Heard 1 Miller) productive from Wilcox-Artman sand at 5,100 ft. Campbell's test is contracted to 5,400 ft.

Milton Crow, Inc., Shreveport, is drilling for Jack Grigsby, also of Shreveport, at a wildcat location 2 miles southeast of Longstreet field, in northwestern DeSoto Parish, North Louisiana. It is a 7,500-ft. Travis Peak test, designated as 1 Schuler estate. Location is 10-13n-15w, 3½ miles northeast of Longstreet.

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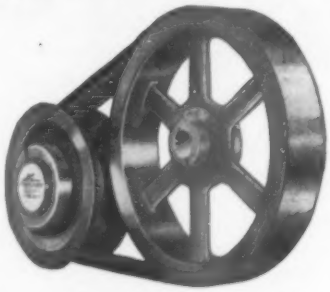

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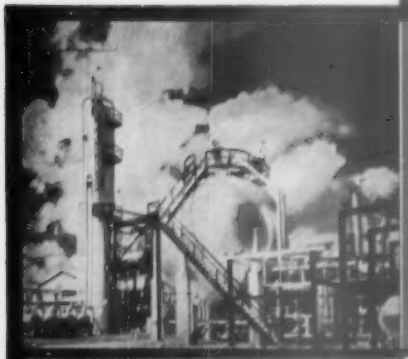

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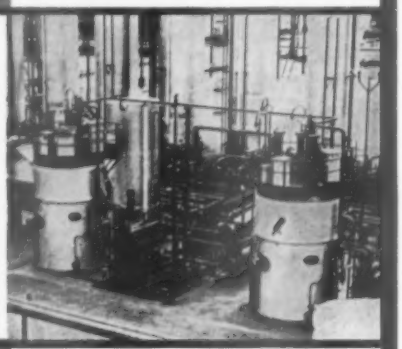

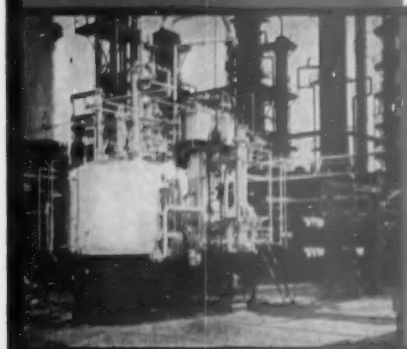

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REFINING

Tax Theory Hit

Barkow asks excise lube levy for re-refiners

WASHINGTON.—Barkow Petroleum Co. of Los Angeles has filed a suit in federal District Court here to make the Bureau of Internal Revenue collect the lubricating oil excise tax from reclaimers and re-refiners.

The suit contends that Barkow and other lubricating oil manufacturers are being injured competively because they pay a 6 cents per gallon tax that the re-refiners don't.

In the past, the bureau has said that it cannot collect the tax because it cannot prove the reclaimed product is equal to the new. However, Barkow claims that all advertising and other claims of the re-refiners represent their product as being equivalent to new.

Counsel for Barkow pointed out that other manufacturers of reconditioned products, such as rebuilt motors, rebuilt tires, and rewound armatures, all must pay the excise tax the same as the original manufacturer.

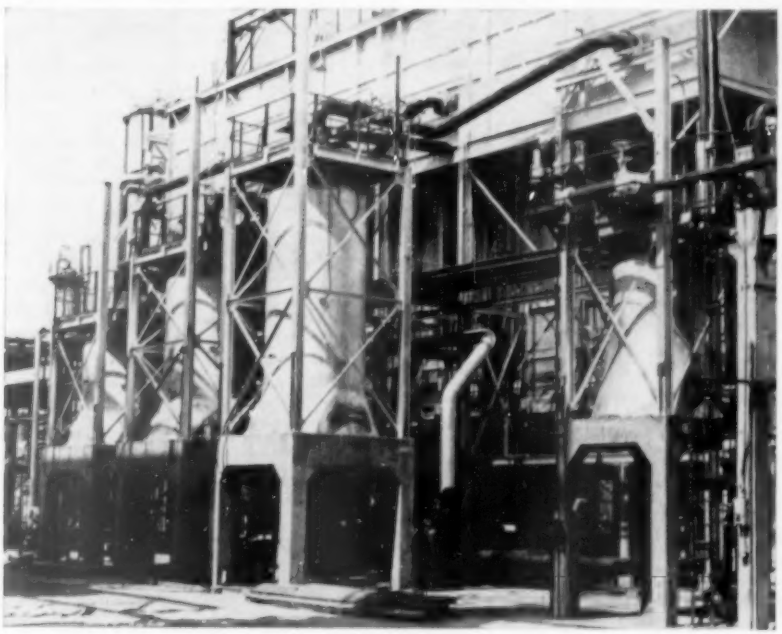
In 1953 reclaimers did approximately a $75,000,000 business. At 6 cents a gallon, the Government would have received $4,500,000 in revenue. According to the bureau, it collected $72,942,437 from lubricating oil taxes in 1953.

WPRA To Hold Meeting At Casper This Month

CASPER, Wyo.—Western Petroleum Refiners Association will hold a regional technical-industrial relations meeting here September 23-24.

A number of technical papers dealing with subjects suggested by Rocky Mountain refiners will be presented at the technical session September 24.

Papers included in the program are: "Fluid Coking Yield Studies," by F. B. Johnson and R. E. Wood, Esso Standard Oil Co., Baton Rouge, La.; "Asphalts from Rocky Mountain Crude Oils," by K. E. Standfield, Petroleum Oil Shale Experiment Station, Laramie, Wyo.; "Electric Mercaptan and Amine Salt Hydrogen Sulfide Processes," by



Houdriformer Goes On Stream At Ohio's Refinery

Ohio Oil Co. has commenced operation of this 8,330-bbl. per day Houdriforming unit recently completed at the Robinson, Ill., refinery. The three vertical vessels at the left are the reactors of the unit and the small reactor at the right is the pre-treater, a guard case which receives the unit feed stream before it passes to the other three reactors. The three-stage heater is shown in the background. Ohio's new Houdriformer is the second of its type to be completed, and the first to operate primarily for production of high-octane motor fuel. The first unit was completed by Sun Oil Co. at Marcus Hook for aromatics manufacture. Ohio's unit was constructed by Catalytic Construction Co. and licensed by Houdry Process Corp.

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Texas City Refining, Inc. went on-stream with a new

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Catalytic Cracking Unit in August, 1953 at Texas City, Texas. This modern, 19,000 BPSD Houdriflow cracker is operating at conversion levels from 60% to over 80%.

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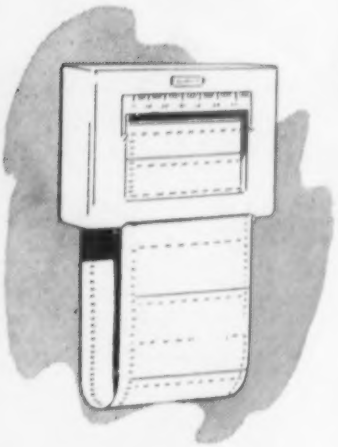

SEGMENTAL RECORDING CHART

Six records are made across the face of this Segmental Recording Chart. And, there are 24 separately numbered segments in one 12 foot loop giving a total of 144 variables recorded at higher speed and with greater readability than ever before. It was developed cooperatively with engineers of E. I. DuPont de Nemours Co., Inc.

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C. W. Rippie and Oliver Zandona, Electric Process Co., Summit, N. J., and "Refinery Fire Insurance Rating," by R. B. McClelland, resident manager of the Tulsa region, Oil Insurance Association.

The industrial relations session will be conducted September 23 with F. E. Mathews, superintendent of industrial relations division of Standard Oil Co. (Ind.) at Casper, serving as chairman. Featured on the program will be a paper, "How One Company Benefited from Employe Opinion Survey," by Curt Holton, director of industrial relations of Ethyl Corp., New York City.

Chanute Refinery Sold

CHANUTE, Kans. — A 1,000-bbl. refinery here owned by Chanute Refining Co. has been purchased by Brown-Strauss Corp., Kansas City pipe suppliers.

Morton Brown, president, said the purchase is in line with his firm's plan to acquire allied industries.

Petrochemicals

Work Nears End

C&C's Oxo unit expected on stream in October

TEXAS CITY, Tex.—Carbide & Carbon Chemicals Co., a division of Union Carbide & Carbon Corp., is nearing completion of an Oxo process unit which will produce more than 60,000,000 lb. of chemicals a year.

The Oxo process is based on the simultaneous reaction of carbon monoxide and hydrogen with an olefin which produces an aldehyde containing one more carbon atom than the original feed stock. The operating pressures range from 1,500 to 6,000 psi. and temperatures are approximately 200° C. In the new unit the Oxo reaction can be carried out with any available feed stock from ethylene up to the high molecular-weight olefins in the 15-carbon-atom range.

Five new plasticizers based on these Oxo alcohols have been introduced within the past few months. In addition, these alcohols can be used as intermediates for they react with dibasic acids, such as sebacic, adipic, and azelaic acids, to produce esters useful as plasticizers and as components of low-temperature lubricants and greases.

The company presently plans to put the unit on stream in October producing iso-octyl alcohol, primary decyl alcohols, and primary tridecyl alcohols.

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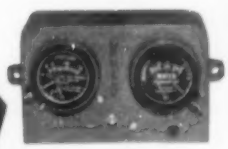
SAFETY SWITCHES

Internal combustion engines are stopped automatically on dangerously low oil pressure or high water temperature. Optional types of disconnect switches and mounting panels available.

Model W-275 features new MURPHY automatic lube oil disconnect switch. Pushbutton sets lockout. Normal lube oil pressure automatically resets switch when engine is started.

For Dual Magneto Ignition

MODEL W-275-D



Slightly larger cast tenzaloy panel than W-275 to provide mounting space for No. 101-D instant snap switch which grounds two magnetos when safety switches operate.

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are rugged, heavy-duty construction — and you can see them working.
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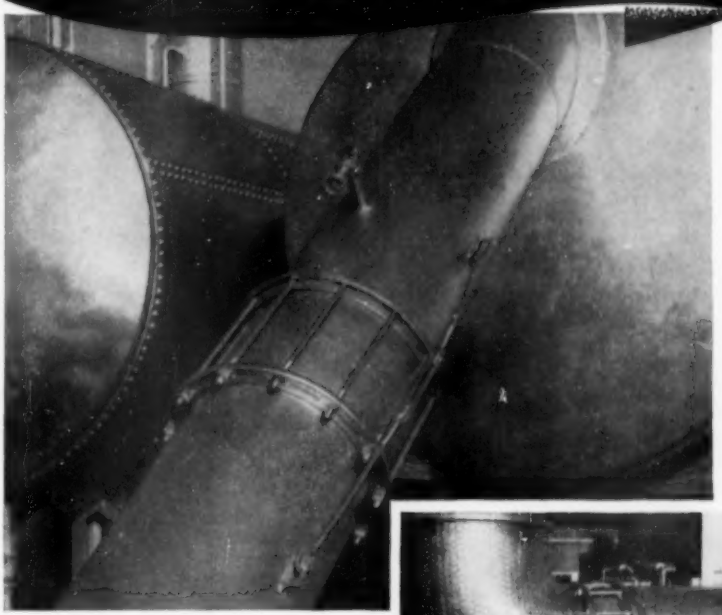

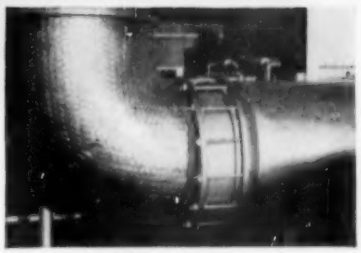

TOP—20" Style 38 Dresser Coupling installed on field gas scrubber line. BELOW—24" coupling in gas-treating plant.

On machinery and tank hookups—at the well or anywhere in-between—the handiest, surest way to get uniformly tight pipe joints is with Dresser Couplings or Long Sleeves.

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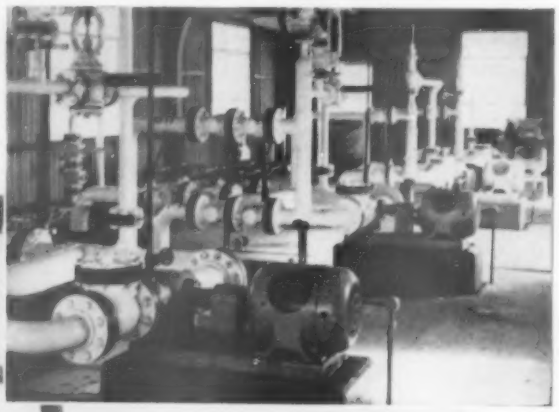
THE TOUGHER THE PUMPING THE BETTER THEY LIKE IT

EXPLOSION PROOF 7½ H.P. Century Performance Rated Explosion Proof Motors drive loading pumps in oil field processing plant



WEATHER-GARD 20 H.P. Century Performance Rated Oil Field Motor powers a pumping unit.

- It's easy to match the motor and the job when you make your selection from the broad and varied Performance Rated Century line.
- By picking the Century Motor that's *right* for the job, you bring out all the performance built into the equipment you use . . . you're sure of dependable operation under all kinds of conditions.
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- **FOR REFINING AND DISTRIBUTION,** Century Performance Rated Explosion Proof Motors protect life and property in explosive atmospheres.

Check your supply store or Century Branch Office. Investigate the complete range of Performance Rated Century Motors—in sizes from ⅛ to 400 H.P.

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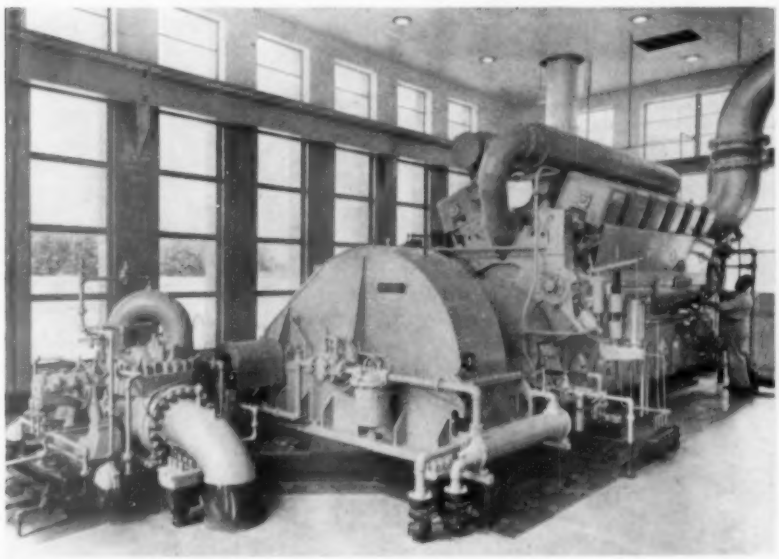


PUMPING EQUIPMENT at Wolverine's Vicksburg station includes a 2,650-hp. diesel engine, 10 to 1 speed increaser, and 5,090 r.p.m. centrifugal pump.

The Wolverine system is a fine example of . . .

What's new in products carriers

TYPICAL of the trend in modern pipeline-design methods are the many engineering features and operational aids which are combined in the new 16-in., 295-mile products carrier of the Wolverine Pipe Line Co. With its very-high-speed centrifugal pumps, turbocharged engines, remote-control facilities, and safety shutdown devices, the system promises to be one of the most efficient of products carriers.

Beginning at Hammond, Ind., the new line runs eastward to a point near Ann Arbor, Mich., where it branches into two segments, one continuing to Detroit, Mich., and the other to Toledo, Ohio. It is a common carrier available to all shippers and subject to the regulations of the Interstate Commerce Commission. Its owners are Shell Oil Co., Cities Service Oil Co., and The Texas Co. The former company was in charge of design and construction.

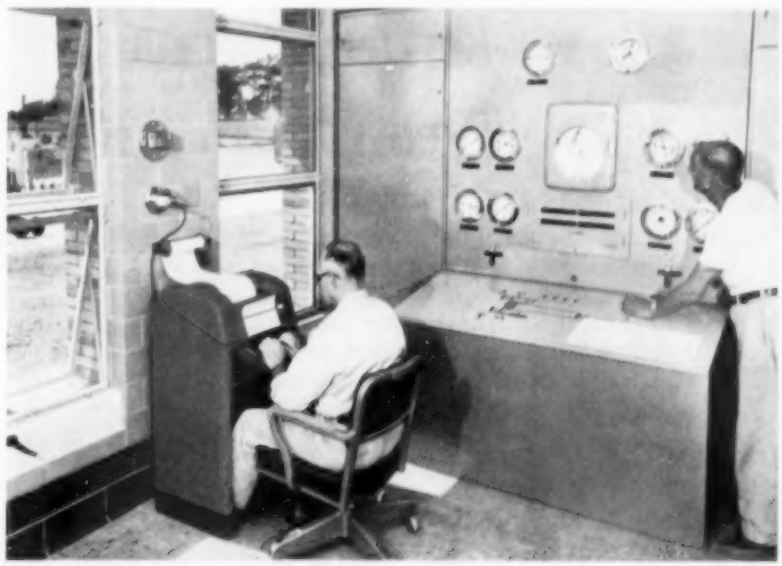
The Wolverine System receives shipment of products through private feeder lines from the Cities Service refinery, and the Shell and Texas terminals in nearby East Chicago. It delivers the various shipper's products to their terminals at Niles, Jackson, and Detroit, Mich., and Toledo, Ohio.

With a current capacity of 95,000 bbl. of petroleum products a day, the line is now being employed to transport diesel fuel, No. 3 fuel oil, premium and house-brand gasoline, kerosine, and prime white. The line capacity may be boosted to 175,000 bbl. per day by adding more pump stations. Currently there are two pumping stations, one at Kennedy Avenue in Hammond and the other at Vicksburg, Mich. The Kennedy Avenue station is the key operating point for the entire Wolverine System. Here two large, two-stage, United Iron Works pumps, each driven by a 1,250 hp. electric motor at a speed of 3,600 r.p.m., provide the initial pumping pressure for the line.

Control of operations is centralized in a separate building. Lights on a large control console indicate the position of all tanks, valves, meters, and pumps on the line and show which are operating. The station operator has finger-tip control over all equipment and by pushing a single button, he starts product flowing from any one of the shipper's tanks. In a similar way, the operator starts and stops one or both of the station pumps.

The Kennedy operator can, if necessary, extend his control more than 100 miles to the Vicksburg station via teleprinter hookup. He can dial code numbers to start or stop the pump at Vicksburg and, by dialing other numbers, can obtain an automatic report of operating conditions at that distant station.

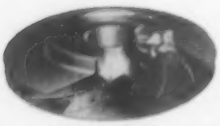
Diesel station . . . The Vicksburg station is markedly different from Kennedy and is in charge of Chester C. Curvey, chief operator. Power comes from a 12-cylinder, 2,650 hp. Nordberg V-type Supairthermal diesel engine, the largest of its type ever installed on a



THE CONTROL ROOM at Vicksburg station. Note the station flow diagram on the lower panel. The teleprinter is also used in remote-control operation.

ALLIS-CHALMERS

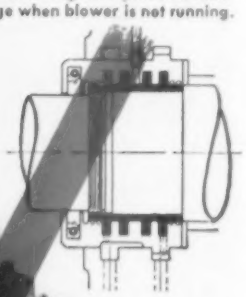
Multi-Stage Centrifugal Blowers

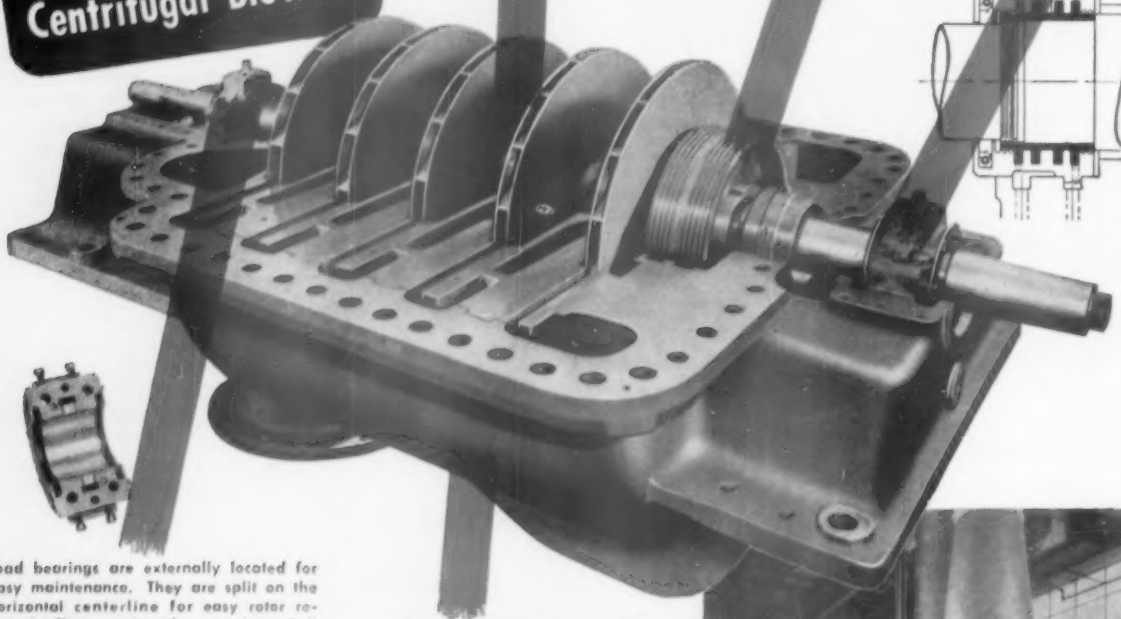


Impeller construction provides unobstructed passage of air or gas. Impellers are furnished in riveted or welded types, as determined by impeller dimension. Note that in riveted impeller wheels, rivets are integral with, and milled from, blade stock.

Impeller wheels are located accurately on shaft with sleeves and are mounted with light shrink fit. Bores are ground to size. Lock nuts prevent axial movement.

Sealing during operation is provided by oil pressure seals. A carbon ring seal prevents leakage when blower is not running.





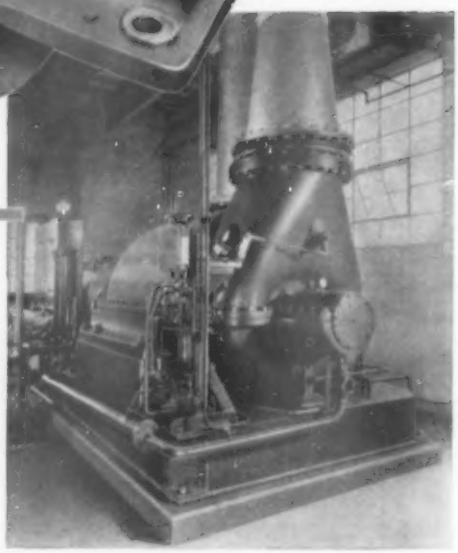
Load bearings are externally located for easy maintenance. They are split on the horizontal centerline for easy rotor removal. They consist of a cast-iron shell with removable, babbit-lined steel inserts.

Casing is heavy cast iron, alloy, or forged steel.

Why these blowers can run for years *without stopping*

The key to "round the clock" performance in fluid catalytic cracking plants is *quality*, as illustrated in the features above.

For highly dependable, low maintenance air and gas handling equipment, as well as motors and control, call your nearby Allis-Chalmers office, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-4465



This Allis-Chalmers four-stage centrifugal blower supplies 24,000 cfm to the catalytic cracking tower of an eastern refinery on a 24-hour-a-day basis, month in and month out.

ALLIS-CHALMERS A-C ALLIS-CHALMERS

TYPICAL of Wolverine's modern, functional buildings is this pump station at Vicksburg, Mich. It is equipped for either local or remote control.

pipeline. The diesel drives a two-stage United Iron Works centrifugal pump rated 3,220 g.p.m. at 2,152-ft. head through a Farrel-Birmingham 10.189:1 (500 to 5,094 r.p.m.) high-speed herringbone-gear speed increaser. At a speed of more than 5,000 r.p.m., the one pump develops as much pressure as the two identical pumps at the Kennedy station.

The new Nordberg engine, first of this V-type to go into operation, has 12 cylinders of 13-in. bore and 16½-in. stroke. It is of the four-cycle type and develops its rated brake horsepower at 500 r.p.m. The engine features high-pressure turbocharging, intercooling, and variable compression ratio. The engine at Vicksburg is presently operated up to 2,000 hp. without intercooling. With intercooling, its rating is increased to 2,650 b.hp., equivalent to 160 b.m.e.p. Later it is planned to install a 3 to 1 pressure-ratio turbocharger and increase the rating to 3,200 b.hp. or 190 b.m.e.p.

In contrast to Kennedy, the Vicksburg pumping and control facilities are housed in a single building of modern brick construction. The station is divided primarily into three operating sections: the engine-pump room; auxiliary room; and control room. All three rooms are attractively tiled and painted to assure clean, pleasant operating conditions. In addition, the station has a lavatory and shower, and a tool and repair room.

Safety was an important consideration in the layout and design of the Wolverine System, and the automatic controls at the Vicksburg station are typical of the care given this feature which makes pipelines the safest known method of transporting petroleum products. The controls are established so that any departure from regular operating pressures, temperatures, etc., both in the line and on the pumping unit, (i.e., high or low lubricating-oil pressure, high cooling-water temperature, engine overspeed) will shut down the equipment and, in certain instances, the entire station. Mercoid controls are installed where required with the central control box located in the auxiliary room. A loud alarm alerts the operator and an annunciator on the control panel indicates the cause of the trouble.

Remote dispatching . . . Maximum line-operating pressure on the Wolverine System is established at 900 psi. gage, and over-all direction and scheduling of the movement of products originates hundreds of miles from the line. This scheduling and other routine Wolverine operations are carried on under contract by Shell's products pipeline department, which has its headquarters in Radio City, New York. There, in a remarkable dispatching room, the dispatchers direct the movement of products in a pipe line half a continent away. They maintain round-the-clock supervision of the entire line with the aid of teleprinters, carefully planned pumping schedules, and an ingenious dispatching board.

The key unit in following the pumping schedules is the dispatching board, a 17-ft. counter-like device. This board serves as a crystal ball, giving an up-to-the-minute picture of the line and telling the dispatchers at a glance exactly what the pumping conditions are at any time. A diagrammatic representation of the line, this board has markers representing the various stations and delivery points with lights showing those in operation. The products in the line are represented by

See Composite and Refinery Catalogs, or Write for Folder On

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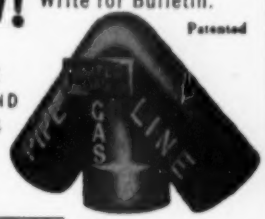

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PIPELINE PATROL

lengths of paper tape, scaled so that an inch represents a certain number of barrels of product, and colored to identify the various products. So accurate is this system that the dispatchers are able to tell within minutes when a particular product will reach a determined point.

This type of control is, of course, highly desirable in keeping the line operating at maximum efficiency for various throughputs. In line with present day policies of operating pipelines from centralized points, the Wolverine system is equipped so that all desirable pressures and flows are made available at the central headquarters through teletype code sequences.

Remote-control starting of the Nordberg-engine pumping units at Vicksburg is equally ingenious and requires only 90 seconds. This system for automatic starting and operation of pumping units is similar to that employed on Shell's North line from its Wood River refinery to East Chicago. It is referred to as the Norris Plank system. This system utilizes the usual engine governor only to prevent overspeed. The primary control of the engine is through direct hydraulic cylinders which position the fuel racks in response to changes in the station's suction and discharge conditions.

On a push-button or automatic start, following the opening of the main, motor-actuated pump valves, circulation of oil is next established through the pump seals and the engine oil system. Next, the start cylinder receives air through a solenoid valve, extending its piston to open the fuel rack wide at the same moment as starting air is admitted to the engine.

When the engine fires and differential pressure across the main pump increases, the solenoid valve to the idle cylinder opens, admitting air to retract the fuel rack to idle position. After a delay through an electric timer, the air is released at a controlled rate by means of a time tank, allowing the engine to transition from idle to control speed over a period of approximately 5 minutes. This multiple sequence insures time to warm up a cold engine and the gradual application of load.

Literally nothing has been left undone which would make the Wolverine System one of the most modern products carriers in operation today. It is a tribute to the people of the Shell, Cities Service, and Texas companies who, with progressive engineering and ingenuity, have established a new standard of pipelining efficiency.

EXPORT TERMINAL, Houston, Texas, handles millions of tons of export shipping yearly. It is one of the world's largest export terminals. All export shipping requires an intimate knowledge of the varying regulations imposed by all the countries of the world concerning packaging, duties, markings and paper work. That is why, if you have any export crating or shipping problems, you should call Tulsa Crating Co., 519 S. Rockford, Tulsa, Okla., Ph. 3-6482 or 3-3492. Over 35 years experience in shipping to points all over the world assures you that, no matter what you are sending where, Tulsa Crating Co. has the know-how and facilities to get it there in perfect condition. Adv.

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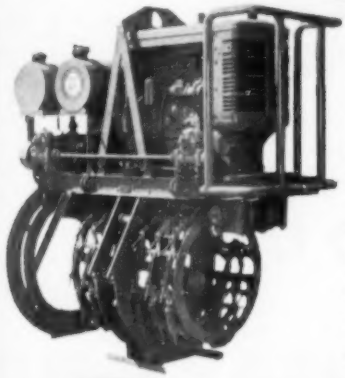
ROLLING RIGS

Model CPF—for 2" to 8" pipe.
Model M —for 3" to 14" pipe.
Model K —for 16" to 26" pipe.
Model R —for 30" to 31" pipe.

CROSE LINE-TRAVELING CLEANING AND PRIMING MACHINE

Rugged and Dependable



The most rugged and dependable cleaning and priming machine on the line . . . equipped with dual multi-speed transmissions providing greater flexibility of control. Interchangeable cleaning and priming assemblies permit each model to process a wide range of pipe sizes.

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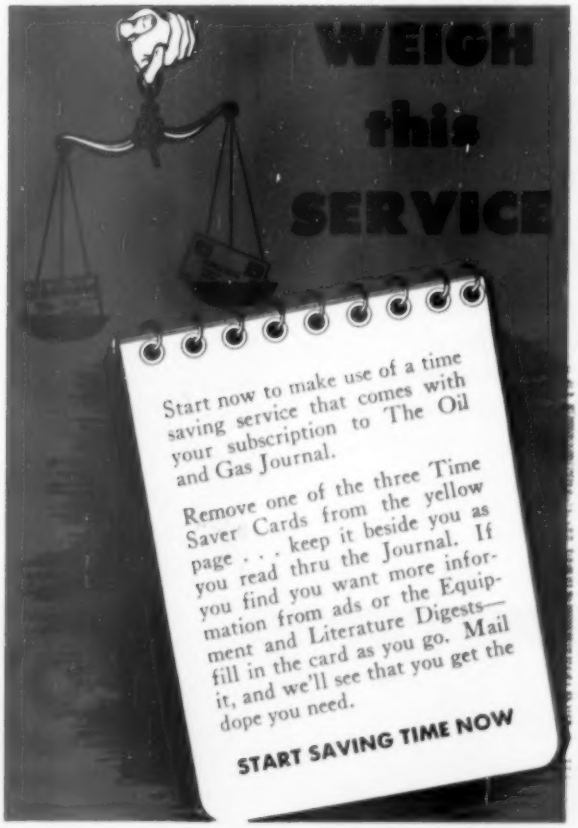
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The kind of performance we promised for Goodall Long-Life Rotary Hose is now a matter of field record. Service actually rendered by this revolutionary rotary hose under practically every conceivable drilling condition has proved it to be the strongest ever built. It is also a matter of record that Long-Life is more durable, more flexible and perfectly balanced. And Barney Couplings . . . the only coupling made that is stronger than the hose itself . . . give Goodall Long-Life Rotary Hose the highest salvage value of any other hose on the market. Before you buy your next rotary hose look around the field. You'll find that the Goodall Long-Life design has eliminated the cause of more than 90% of rotary hose failures. And you pay no premium for this extra quality, longer life and higher salvage value. It costs no more than ordinary hose. So next time get the best. . . . specify Goodall Long-Life Rotary Hose.

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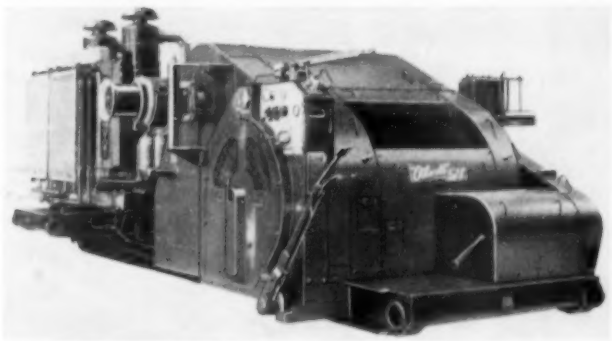
. . . What's New in Equipment?

Use the handy Time-Saver Cards ✔✔✔ to obtain additional information on these items

by Dan B. Miller

Shallow-to-Medium Rig Built by Oilwell



A new rig for 3,500 to 6,000-ft. drilling, with 4½-in. drill pipe, known as the No. 52-T, has all the functional and structural features of other rigs in Oilwell's line.

This rig is designed with a torque converter mounted in the draw works which permits a wide choice of engines by simply selecting the proper engine-sprocket size to give the correct torque-converter speed. An integral transmission provides two forward speeds and one reverse speed for both the drum and the rotary. Single or dual-engine drives are available. The torque converter can be removed from the draw works if engine-mounted torque converters are to be used.

This rig is also equipped with the 306°-wrap main brake and uses spray water cooling to the brake rims. A built-in hydromatic brake is driven from the off driller's side. The No. 52-T is equipped with a combination pressure-oil-and-grease lubrication system. All grease fittings are conveniently located and grouped together for easy access.

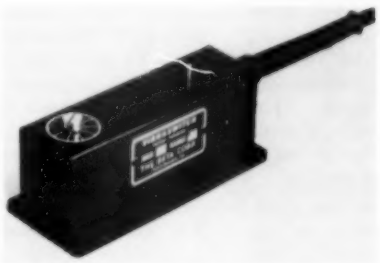
An optional full-floating sand reel mounted on the catshaft can be furnished. The sand reel has large band brakes and air-operated friction clutch. The capacity of the sand reel permits spooling of 12,150 ft. of 9/16-in. line. All guards and covers are removable. *Oil Well Supply Division, United States Steel Corp.*

Check No. 1 On The Time-Saver Card

●

VibraSwitch Protects Pumps, Engines, and Compressors

New Model 1 VibraSwitch is used for the protection of expensive rotating equipment such as compressors, and gas engines against damage from excessive vibration. An enclosed single-pole double-throw switch is actuated when vibration exceeds normal by a preselected amount. It may be used to actuate a local or central-station warning device or to shut down the machine. Flat response from 12,000 r.p.m. insures reliable performance on high-



speed equipment. The VibraSwitch requires no special power source or auxiliary apparatus. *The Beta Corp.*

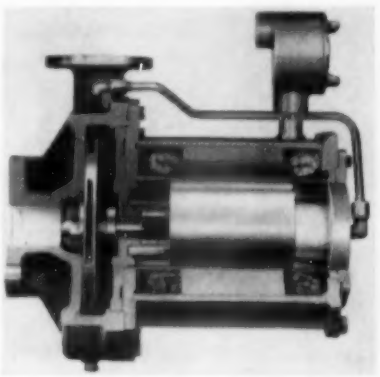
Check No. 2 On The Time-Saver Card

New Centrifugal Pump Guaranteed Not to Leak

Combining motor and pump in one compact package, Chempump eliminates mechanical seals, stuffing boxes, and packing glands, and thereby eliminates 90 per cent of centrifugal-pump maintenance problems.

Design of the Chempump allows pumped fluid to enter the rotor chamber. A stainless-steel liner, inserted in the air gap of the motor, isolates the stator section. Automatic lubrication of bearings is provided by the fluid being pumped, and bearings can be replaced by hand, without special tools and without breaking pipeline connections, in less time than it takes to repack an ordinary centrifugal.

Chempumps are available in cast-iron, stainless-steel, and Monel construction, with a wide variety of other

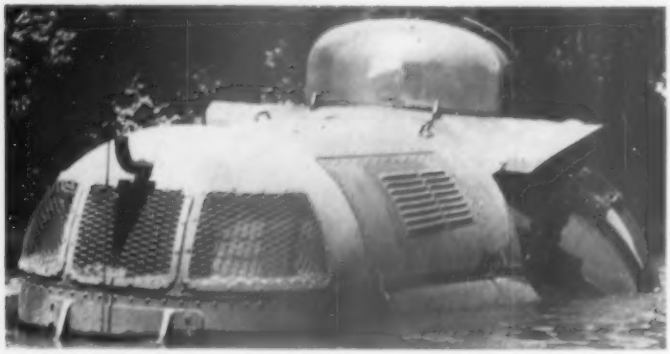


materials available on request. Sizes range from ⅛ to 3 hp. giving capacities up to 180 g.p.m. at heads up to 90 ft. Models in the ⅓, ¾, 1, 2, and 3-hp. range have Underwriters Laboratories and Canadian Standards Association approval for explosionproof operation in Class 1, Group D service.

Standard units can handle fluids at temperatures to 450° F. and pressures to 150 psi. Simple modifications permit pumping at temperatures to 600° F., and at pressures to 5,000 psi. *Chempump Corp.*

Check No. 3 On The Time-Saver Card

What's New... Use the handy Time-Saver Cards



Rhino Travels Roughest Terrain

The Rhino amphibious vehicle successfully traverses mud flats, marshes, rough terrain, and also cruises in water. The new vehicle can negotiate swamps, soft mud, sand, climb 65 per cent grades, or travel down the highway at 45 m.p.h. With Hydrojet propulsion, the Rhino may be operated and maneuvered in deep water.

The Rhino has a huge pair of hemispheroidal, hollow-spun, aluminum wheels in front, plus a smaller pair in the rear. For highway operation, only a narrow rubber tread touches the road. In soft places, the traction area is increased with every inch of sinkage of the hemispheroidal wheels.

The vehicle is floated in deep water by the large wheels and by its watertight body. Power and steering in the water are provided by a Hydrojet, making it so maneuverable in water that it turns easily in its own length. *Marmon-Herrington Co., Inc.*

Check No. 4 On The Time-Saver Card

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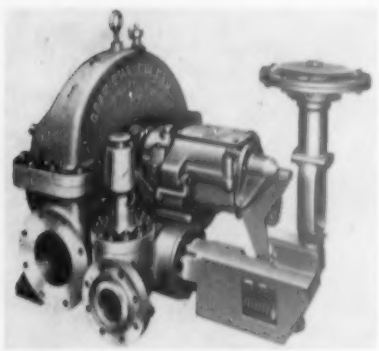


Pressure Regulators Used On Dean Hill Turbines

Designed for boiler-feedwater applications requiring precise automatic control of water pressure, pressure regulators can be used with any Dean Hill turbine model of either horizontal or vertical design. They are furnished with direct-acting or remote control, and can be arranged to maintain a constant pump-discharge pressure or a constant differential pressure over boiler pressure.

The regulator controls all turbine speeds up to normal rating, but above this point the turbine governor overrides the regulator to prevent overspeeding. The emergency trip valve remains independent. To effect maximum efficiency of control and eliminate lost motion and deflection, the regulator is mounted on a rugged support made of welded 6-in. channels. *Dean Hill Pump Co.*

Check No. 5 On The Time-Saver Card

●

Agra Meter Eliminates Cathodic Interpretation

The cathodic protection of coated lines is usually checked by measuring the voltage between the pipe and a copper-sulfate electrode with a portable meter. The equipment used cannot be left in place and has to be operated by an engineer or other skilled personnel.

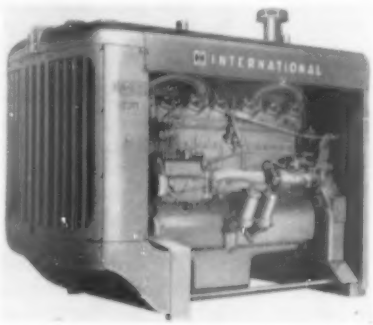
The Agra meter eliminates this problem and in addition has a red mark showing when unsatisfactory conditions exist. A valuable feature of the indicating meters is their ability to give quick notice of trouble. The meter is in a weatherproof cast-steel case and comes with clamps, 3 ft. of conduit, electrode, and backfill. Meters for servicing up to three lines from one electrode are available. *Agra Instrument Co.*

Check No. 6 On The Time-Saver Card

●

International Introduces Its Largest Power Unit

The new UD-1091 diesel power unit replaces the UD-24 International diesel power unit. The engine produces 203 intermittent horsepower or 162.4 hp.

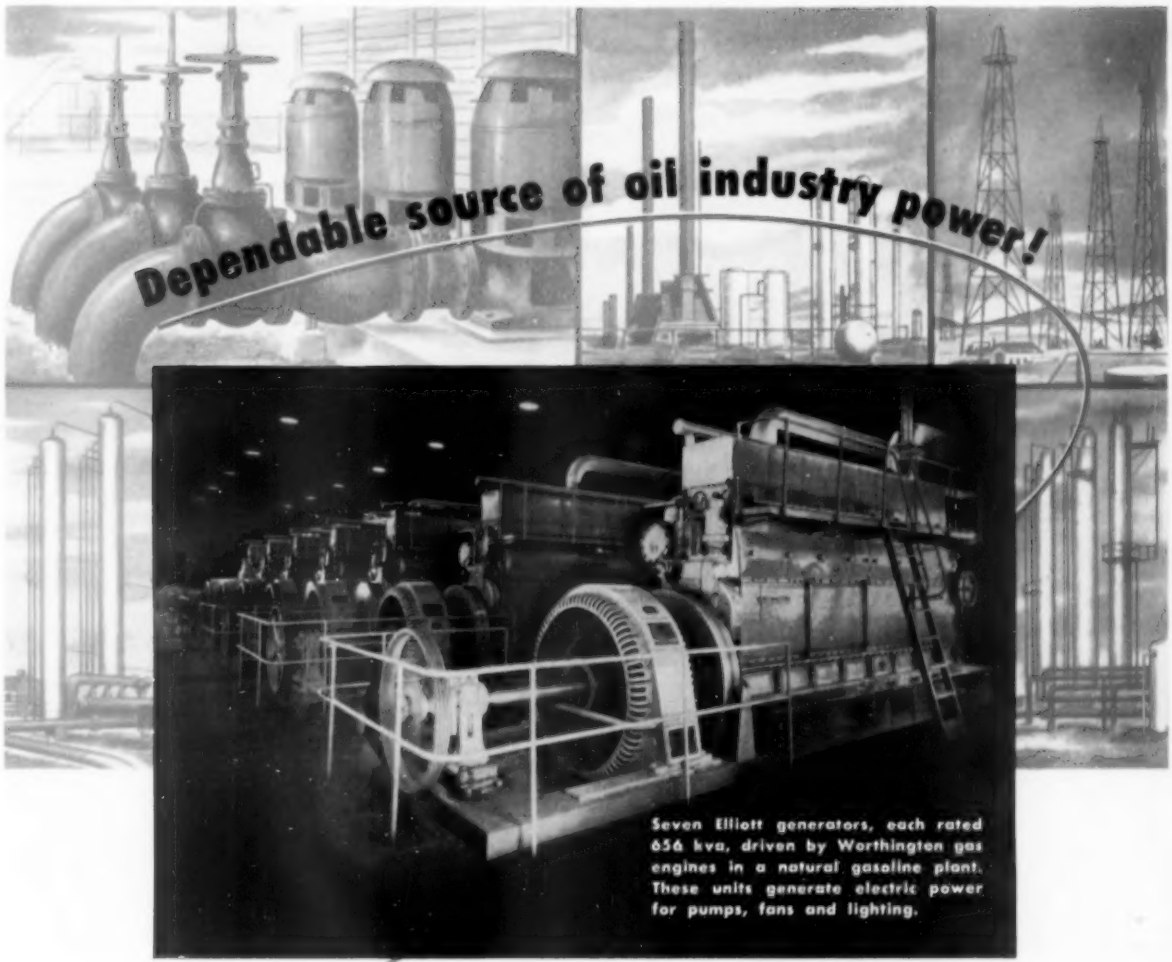


at 1,400 r.p.m. As a power unit, the UD-1091 produces 190 intermittent horsepower or 152 continuous horsepower at 1,400 r.p.m.

Net maximum torque of the unit is 793 lb. at 1,000 r.p.m. It has all the heavy-duty features of the UD-24 including counterbalanced crankshaft, full-flow lubricating-oil filters, twin-plunger injection pump, Vernatherm bypass thermostats for quick warmup and efficient operating temperatures, and the International gasoline-conversion starting system.

The entire unit is skid mounted and is available with or without radiators, with air or mechanical throttle and clutch controls, and with various gear ratios for power-takeoff speeds above or below rated engine r.p.m. *International Harvester Co.*

Check No. 7 On The Time-Saver Card



Seven Elliott generators, each rated 656 kva, driven by Worthington gas engines in a natural gasoline plant. These units generate electric power for pumps, fans and lighting.

ELLIOTT GENERATORS

Look for them on the business end of engines in power plants everywhere — on diesels, gas engines, dual-fuel setups — teaming up smoothly with their driving units, quietly and reliably making those kilowatts vital to the industry's production.

Elliott Fabri-Steel Generators are built in every detail for long service. Frames and rotor spiders are of welded steel for crack-proof strength and extra stiffness. Damper winding joints are of large area, silver-brazed for strength and high conductivity. Air gap adjustable both vertically and horizontally. Easy accessibility to the rotor is provided by removing holding bolts on frame feet, and sliding frame along, beyond the rotor.

For the many construction details which make these generators favorites of oil industry power plants, write for Bulletin PB-2000, or consult your local Elliott representative, or write Elliott Company, Ridgway Division, Ridgway, Pa.

Elliott FABRI-STEEL MOTORS AND GENERATORS

ELLIOTT Company

TURBINE-GENERATORS TURBINES MOTORS GENERATORS DEAERATING HEATERS EJECTORS CONDENSERS COMPRESSORS TURBOCHARGERS TUBE CLEANERS STRAINERS

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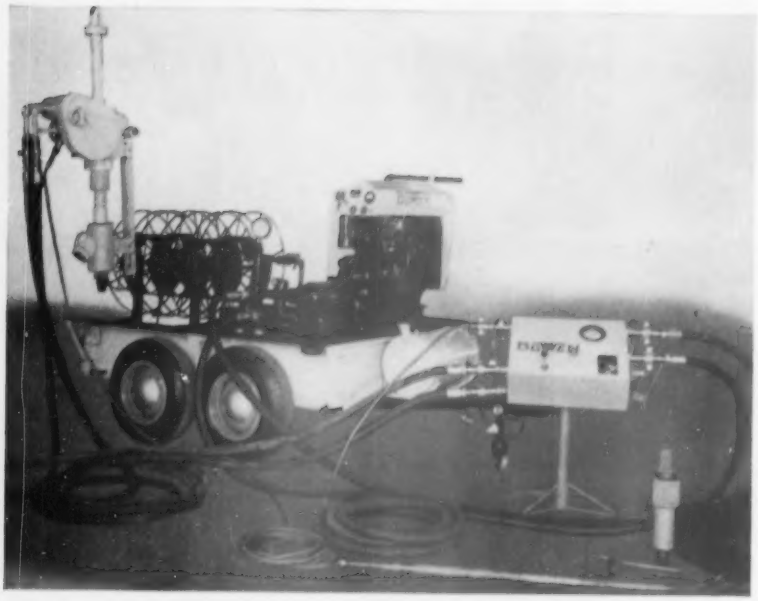


Powered Swivel Develops 80 r.p.m.

The new type D Bowen powered swivel develops a speed of 80 r.p.m. in high gear and a speed of 40 r.p.m. in low gear; an increase in speed of more than 85 per cent over the Type C Bowen powered swivel. The torque that this new unit develops is approximately the same as that developed by the Type C swivel. The Type D powered swivel is available either as a skid-mounted unit or as a trailer-mounted unit.

This powered swivel consists essentially of a prime-mover unit, a control unit, and a swivel unit. The prime mover of the Type D is powered by a 44 hp., 4-cylinder, overhead-valve, water-cooled gasoline engine. The gasoline engine is coupled through a gear reduction to a hydraulic pump which is provided with a relief valve to protect the entire assembly from overloading. Both the engine and the hydraulic pump are mounted on an oil reservoir.

The control unit is pedestal mounted and is provided with a speed regulator, a direction control, and a torque control enabling the operator to easily and instantly control the speed, the direction of rotation, and the torque that the unit will develop. The swivel unit consists of a fluid motor coupled through gear reduction to a drive sub. An elevator is provided so that the unit can be easily suspended in the derrick. The hoses are in 50-ft. lengths to permit operation high in the derrick and to permit location of the gasoline engine at a safe distance from any danger area.

Bowen powered swivels are used by operators for all types of medium and light-duty rotary operations because they eliminate the necessity of moving in kellys, rotary tables, or other heavy equipment for short-time rotary work. They provide the driving power for internal cutting of casing, drill pipe and tubing; for drilling out cement following squeeze jobs; for backing off sucker rods and tubing; for drilling out obstructions in casing and tubing; for milling in casing and tubing; for scraping liners; or for deepening holes. *S. R. Bowen Co.*

Check No. 8 On The Time-Saver Card

●

High Pressure Motor Valve Offered In Inch Size

This new 1-in., high-pressure motor valve is rated at 4,000 lb. w.p. Available in either an angle or through body, the motor valve is designed with screwed ends. It is reversible in that it is pressure opening or pressure closing. It is equipped with Teflon packing and requires no adjustment. The design of the valve characterizes it for gas or liquid-throttling service. Carbide-plug

sizes are ⅛, 3/16, ¼, ⅜, and ½-in. *Kimray, Inc.*

Check No. 9 On The Time-Saver Card

●

Hydraulic Pumping Unit Has Slow 10-Ft. Stroke

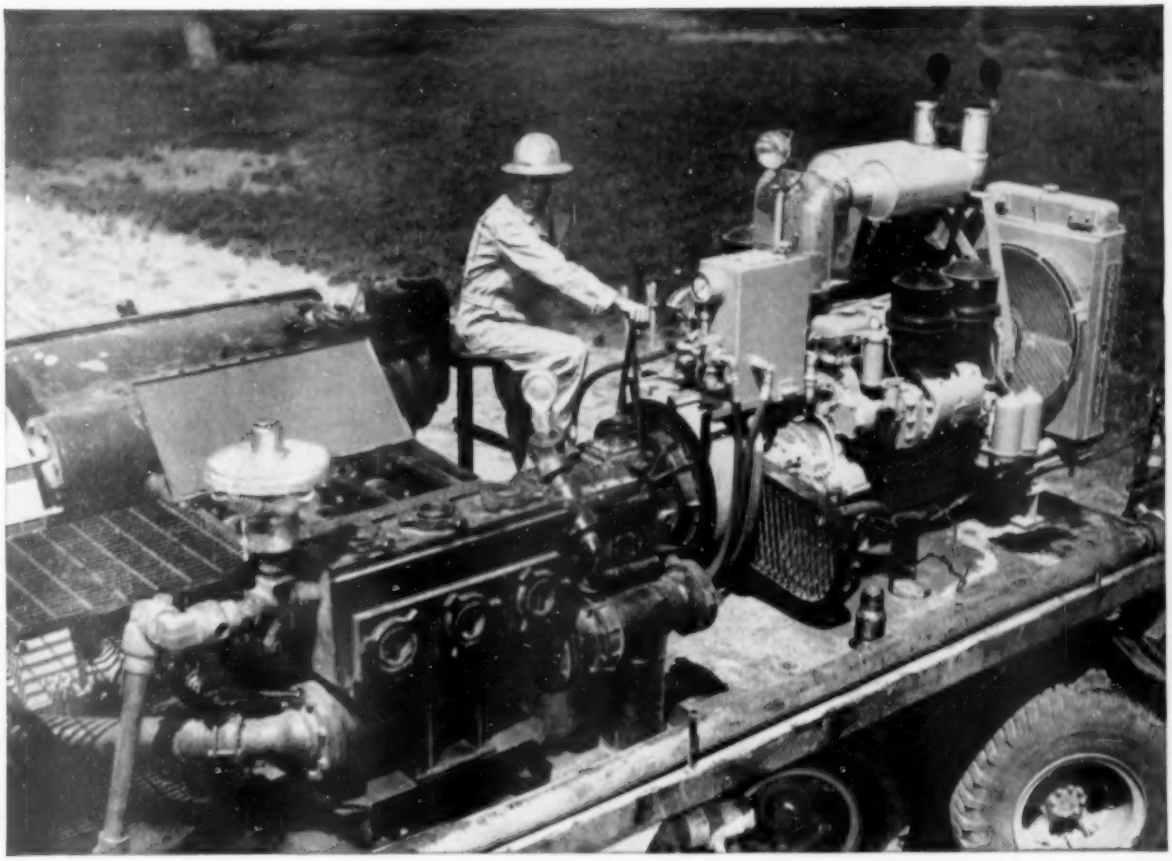
A 10-ft.-stroke model incorporating all the design features and advantages of its 6-ft.-stroke models has been added to S. C. Carter's line of hydraulic pumping units for stripper wells.

The specifications of the new model are: Model G10; cylinder size 4½-in. i.d., 10-in. stroke tank capacity 100 gal., jackshaft diameter 1 7/16 in.; standard pump Model V144, shipping weight 1,150 lb., net piston area 14.9 sq. in., piston displacement 7.74 gal., maximum operating pressure 750 psi., maximum polished-rod load 11,000 lb., maximum s.p.m. 3.3.

The new model is recommended for applications where required production may exceed the capacity of the 6-ft.-stroke models. The advantages accruing to the operator from the use of the long, slow upstroke with relatively fast downstroke of the existing 6-ft.-stroke models are accentuated by the longer, slower upstroke of the new model.

The unit consists of a cylinder assembly and compact power unit which includes a positive displacement power pump and storage tank. For normal installations the cylinder is simply bolted to the well head, without need of foundation. Where desired the cylinder may be elevated, as illustrated. *S. C. Carter Co.*

Check No. 10 On The Time-Saver Card



SANDFRAC AIDED BY MUD ACID

Effectiveness of Sandfrac increased by preliminary Mud Acid treatment to clean the formation face

Here's another case where Dowell ingenuity and know-how paid dividends on a well completed in a sandstone formation.

A breakdown of the formation with crude oil was attempted prior to a Sandfrac* treatment. Abnormally high injection pressures at low pumping rates indicated that the Sandfrac material could not be safely injected into the formation. Dowell engineers then decided to use Mud Acid to break down the formation and remove mud and other materials from the pay zone face.

As a result of this use of Mud Acid the Sandfrac injection pressure was reduced approximately 50 percent and the pumping rate was increased from 1 to 7 bbls/min.

The success of this and many other Dowell oilfield services is due largely to the versatility of the high-volume, heavy-duty equipment Dowell uses, and the interest of Dowell in helping to solve your problems. For all the facts call your nearest Dowell station, or write to DOWELL INCORPORATED, Tulsa 1, Oklahoma, Dept. I-11.

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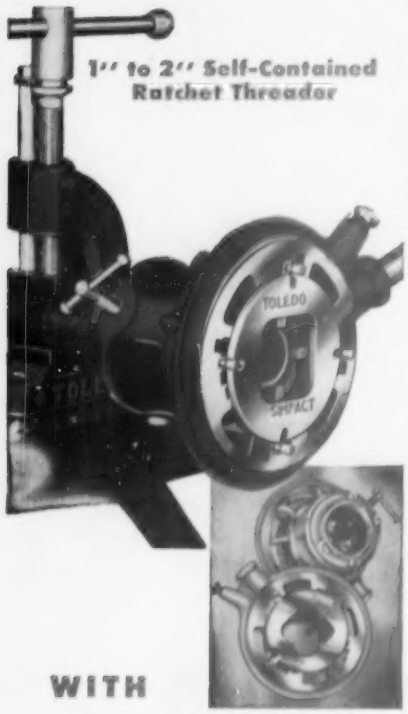

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CAM-TYPE
PIPE HOLDER

★ *Improved* cam-type quick-action pipe holder has broader jaws for more positive grip on pipe.
★ Free action cam assures instant setting to any size—1" to 2".
★ Easy to center . . . you get perfect aligned threads.
★ Fewer moving parts . . . minimum wear . . . light in weight. Amazingly compact . . . will thread a pipe projecting through a wall as short as 6¼".
★ Accuracy proven through the years . . . dies recede along tapered steps. A fine quality tool—yet low in cost! Write for new catalog. Order through your supply house. The Toledo Pipe Threading Machine Co., Toledo, Ohio.

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TOLEDO

PIPE TOOLS..POWER PIPE MACHINES..POWER DRIVES

They're NEW

- Bulletins
- Catalogs
- Brochures

for your copy, check ✓ ✓ the Time-Saver Cards.

Four-Way Squeeze Gun is the subject of the most recent issue of Wireline. The new four-way squeeze gun is a specialized instrument designed to increase the chances of success in block squeezing. This is squeeze cementing to protect a possibly productive zone from fluid migration. *Lane-Wells Co.*

Check No. 11 On The Time-Saver Card

●

Junior Heaters. Catalog 32-01 includes two types of indirect heaters for small volumes of gas. Model JR1 is rated at 75,000 B.t.u. per hour and the Model 70J is rated at 85,000 B.t.u. per hour. The catalog includes complete descriptions of both units, applications, cutaway flow diagrams, operating information, sizes, capacities, and dimensions. *Black, Sivalls & Bryson, Inc.*

Check No. 12 On The Time-Saver Card

●

The Koppers - Hasche Reformer for producing interchangeable gases at low cost is the subject of the new 12-page brochure E 30-5M. Featured is a multicolor flow diagram on a three-page fold-out. *Koppers Co., Inc.*

Check No. 13 On The Time-Saver Card

●

Industrial Equipment for Chemical Process Industries. A new 16-page Catalog No. CEC-55 illustrates and describes, with use and application data and specifications, a line of pressure filters, ion exchangers, centrifugal pumps, heat exchangers, and rubber-lining service. *Industrial Filter & Pump Manufacturing Co.*

Check No. 14 On The Time-Saver Card

●

Forged-Steel Welding Pipe Saddles and Reducers contains data tables including list prices; weight; pipe, nozzle, and header sizes; and over-all length of saddles and reducers in schedules from 10 to 160. *Steel Forgings, Inc.*

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Industrial Waste Treatment. Advantages inherent in the treatment of in-

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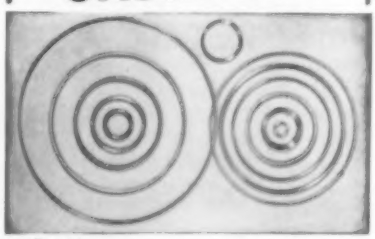

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dustrial waste waters and process liquors are described in Bulletin WC-116. Schematic drawings, pictures, and a problem-solution-result type of explanation demonstrate how Graver equipment solves such problems as process and cooling-water shortages, contamination of streams with plant effluents, and the loss of valuable heat and materials in discarded waters and process liquors. Particular attention is given to the petroleum industry. *Graver Water Conditioning Co.*

Check No. 16 On The Time-Saver Card

●

Coromat, a new four-page booklet, lists the advantages of Fiberglas Coromat as reinforcement for enamel on underground pipe. The booklet also lists Fiberglas Coromat distributors in the various parts of the nation and has an estimating table for determining the quantity of Coromat required per mile for various-size pipe. *Owens-Corning Fiberglas Corp.*

Check No. 17 On The Time-Saver Card

●

Data Sheet on ACEC VHS Pump Motor. The Belgian Electric Sales Corp., United States representative for ACEC electric motors, has produced a new technical data sheet on ACEC vertical, hollow-shaft pump motors. The sheet provides complete information and illustrative diagrams on the major dimensions of these motors which are especially suitable for industrial pumping applications. *Belgian Electric Sales Corp.*

Check No. 18 On The Time-Saver Card

●

Carco "C" Winch On Pipe Job an illustrated folder describes the methods of laying pipe with a winch mounted on an Oliver OC-3 tractor. Included is an exploded illustration of the Model C winch and technical data. *Pacific Car & Foundry Co.*

Check No. 19 On The Time-Saver Card

●

Tank Heaters. New four-page Bulletin No. 541 describes the TF-18 tank heater that mounts vertically, preventing sediment from settling on the heating surface, thus avoiding heating through a layer of sediment. The unit leaves the bottom of the tank uncluttered and easy to clean. It is said to provide more efficient, less costly tank heating than bottom coils. It can be installed quickly and inexpensively in new or existing tanks without requiring welding in the tank. *Brown Fintube Co.*

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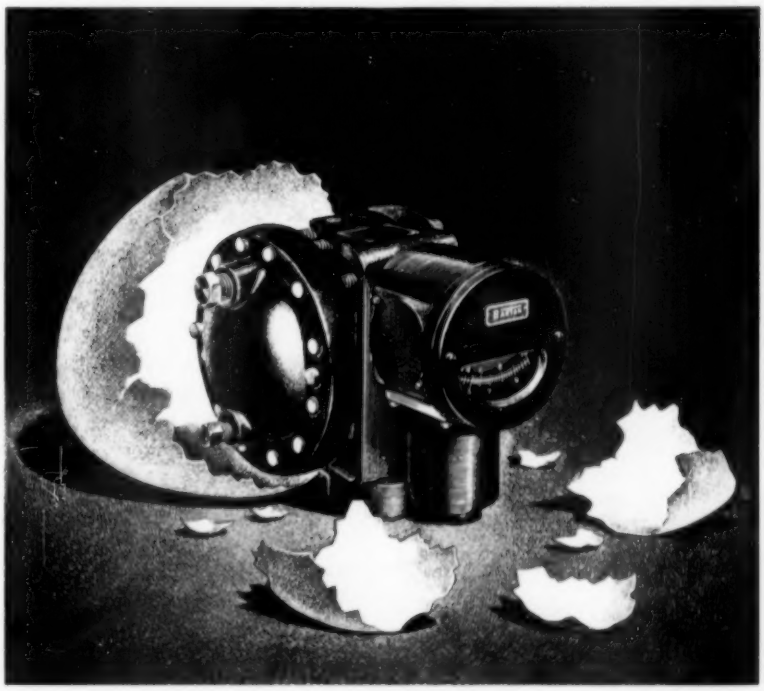
BARTON'S NEW BABY!



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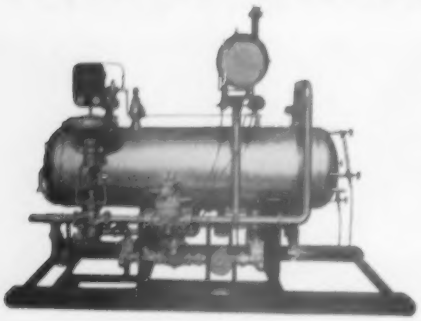
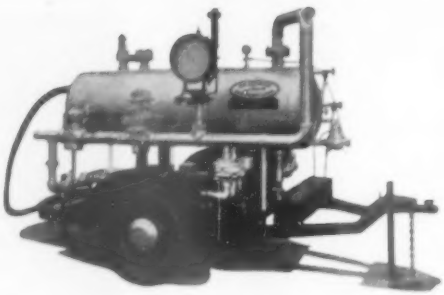


PERMANENT



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1954-55 DIRECTORY

Oil Refineries, Field Processing, Petrochemical Plants . . .
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The new edition lists men in U. S. and Canadian refineries and petrochemical plants. Also a complete listing of U. S. field processing plants. Published June, 1954—132 pages—over 6,000 key men—with addresses.

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Box 1260 — Tulsa, Oklahoma

EQUIPMENT MEN . . . in the News

Tube Turns Plastics Will Make Unplasticized Fittings

A new patented process of injection molding of unplasticized polyvinyl chloride will be used exclusively by a company just organized, Tube Turns Plastics, Inc., in the manufacture of industrial plastic pipe fittings and custom-molded products.

Tube Turns Plastics, which will be located in Louisville, Ky., was established jointly by Tube Turns Division of National Cylinder Gas Co. and Jackson & Church Co. Formation of the new company was announced by George O. Boomer, president of Tube Turns, Louisville, and Clifford W. Stuart, president of Jackson & Church, Saginaw, Mich.

Tube Turns Plastics will also make fittings and custom-molded products from other thermoplastics and from thermosetting plastics.

David L. Perot, chairman of the board and executive committee of Jackson & Church, was elected board chairman of the new company. Boomer, chairman of the executive committee of National Cylinder Gas, was elected president. He is also president of The Girdler Co., another National Cylinder Gas division. Carl McLaughlin, formerly assistant to the executive vice president of Tube Turns, was elected executive vice president. James W. Hendry and John G. Seiler were elected vice presidents. Seiler is executive vice president of Tube Turns.

Harper Made Assistant to General Metals President

William F. Harper has been made administrative assistant to the president of General Metals Corp., San Francisco, according to William E. Butts, president of the firm.

Harper was formerly with Consolidated Vultee Aircraft Co. in San Diego and prior to that with Allan B. Dumont Laboratories in East Patterson, New Jersey.

Aero Creates Research, Development Branch

R. T. Amis, Jr. (center), president of Aero Design & Engineering Co., and Dr. George L. Cross (right), president of Oklahoma University, formulating arrangements for a research and development section to be located on Max Westheimer field at University of Oklahoma. T. R. Smith (left), vice president in charge of research and development at Aero Design will head this new project.

Aero Design & Engineering Co., manufacturers of the Aero Commander twin-engine executive plane, has announced the creation of a research and development engineering division which will be located on Max Westheimer field near University of Oklahoma's school of aeronautical engineering. The announcement came from R. T. Amis, Jr., president of Aero Design & Engineering.

T. R. Smith, designer of the Commander, will be vice president in charge of the research section, recently authorized by Aero's board of directors. The research and development section will be doing design studies, development, and test work, including flight tests.

Dr. George L. Cross, president of the university, and staff members of the aeronautical engineering section of the university, described the new venture as one of mutual benefit to both the university and the company.

Midwestern Constructors Separates Services

F. E. STANLEY

Division of Midwestern Constructors, Inc., oil-country engineering and construction firm with headquarters in Tulsa, into two companies was disclosed recently. Some officers and employes of Midwestern Constructors have formed a new corporation, Tuloma Builders, Inc., and will handle gasoline-plant, industrial-plant, gas-compressor-station, and oil-pump-station engineering and construction.

Midwestern Constructors will specialize in pipeline construction. Mid-

CLYDE WYANT

C. C. BLEDSOE

western Constructors has been operating with two departments. These were the pipeline department and the engineering and plant-construction department.

Work of the engineering and plant-construction department will be handled by Tuloma Builders.

Details of the split were disclosed by F. E. Stanley, president of Midwestern Constructors and Clyde Wyant, formerly vice president of Midwestern

ROBERTSON

MRS. RYDER

Constructors and president of the new company.

Officers of Midwestern Constructors will be Stanley, president; C. C. Bledsoe, formerly secretary and treasurer, now vice president and treasurer; Ray

C. Robertson, formerly assistant office manager, now secretary; and Mrs. R. P. Ryder, formerly secretary to Stanley and Bledsoe, now assistant secretary and assistant treasurer.

T. F. HANSEN

J. A. BARD

Tuloma Builders officers will be T. F. Hansen, formerly general office manager for Midwestern, now chairman of Tuloma's board; Wyant, president; J. A. Bard, vice president of Midwestern, now vice president of the new company; and Grace George, formerly secretary to Wyant, now secretary and treasurer of Tuloma. Charles B. Barry will be chief engineer of Tuloma Builders.

Prior to organization of Midwestern Constructors, Stanley was associated with Cities Service Gas Co., Texas Empire Pipe Line Co., Continental Construction Co., Sheehan Construction Co., and Natural Gas Pipeline Co. of America.

In his 26 years of experience in the construction industry, Bledsoe has served in various capacities for Texas Empire Pipe Line Co., Cities Service Gas Co., Empire Oil & Refining Co., Natural Gas Pipeline Co. of America, and Texas Pipeline Co.

GRACE GEORGE

C. B. BARRY

Hansen joined Midwestern in 1939. He worked for 13 years in construction and engineering as material clerk, timekeeper, and field office manager for several contractors and major pipeline-operating companies prior to joining Midwestern.

Wyant has served as an electrical engineer in gasoline plant construction and operation, a driller and engineer on mechanical drilling rigs, a field superintendent on various construction projects, and directed an oil-well-drilling firm.

Bard was employed by Sinclair Refining Co. for 12 years and spent 4 years with Walco Engineering & Construction Co. as superintendent of various types of station and plant-construction jobs prior to joining Midwestern in 1945.

Barry spent a number of years with constructing firms before joining Phillips Petroleum Co. With Phillips he spent 7 years as process engineer and eastern district engineer. He next joined the engineering staff of Jones & Laughlin Supply Co., and for the 3 years immediately preceding his affiliation with Midwestern was chief engineer, Southwest division, chemical plants division, Blaw-Know Construction Co.

Lymburner Is Sales Manager For Canadian Aero Service

James Harold (Red) Lymburner, well-known aviation executive, has been named sales manager of Aero Service Ltd., Ottawa.

Lymburner brings a broad background of flying and sales experience to his new post. A bush pilot in the Canadian tradition, his flying career started 26 years ago. He has flown over many remote areas in Canada, and was chief pilot for the two Ellsworth

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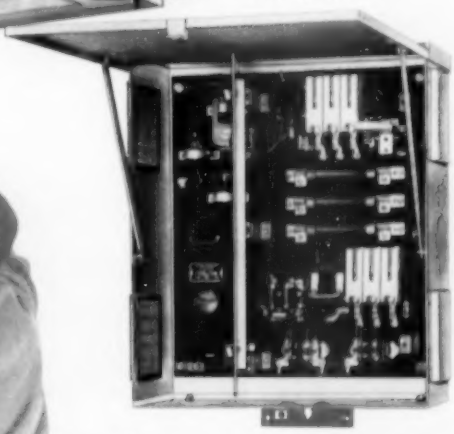

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Incorporates provisions for 3 types of starting. Permits in-the-field alteration to meet changing needs.

The *improved* Cutler-Hammer Oil Well Pumping Control is now ready. It provides the same important features which have made Cutler-Hammer Oil Well Pumping Control so widely preferred in the past. But in addition, it now permits easy *in-the-field* modification of each unit to include further operating features frequently desired.

Some oil well operations require a control that restarts a pump motor automatically after a power outage. Other operations make control equipped with low voltage relays desirable . . . so each pump motor is restarted manually after power is restored. Still others desire control units equipped with automatic timers to provide the same staggered restarting automatically.

The new Cutler-Hammer Oil Well Pumping Control permits the quick and easy incorporation of any of these restarting features by two changes in the basic construction of the unit. First, the panel of the control is drilled at the time of manufacture to allow easy mounting of either the low voltage relay or the automatic timer. Second, a diagram inside the cover shows all circuit arrangements with leads numbered to permit easy change of wiring. This new standardized construction does not alter the operation of the control when used WITHOUT relay or timer but does permit easy *in-the-field* incorporation of either of these features when desired.

And in this control you get the following widely preferred features. Aluminized case to repel sun's heat. Chimney-draft ventilation for cooler operation. Cool, dust-safe vertical contacts. Protected openings that keep out dirt, dust and bugs. Optional 3-coil overload protection against single phasing. Flexible program time switch for scheduling and for day omission. Non-"blow up" lightning arrestors, etc., etc., etc.

Ask to see this new control now. Or write for descriptive bulletin. CUTLER-HAMMER, Inc., 1453 St. Paul Ave., Milwaukee 1, Wisc. *Associate:* Canadian Cutler-Hammer, Ltd., Toronto, Ontario.

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CUTLER-HAMMER
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expeditions to the Antarctic in the thirties.

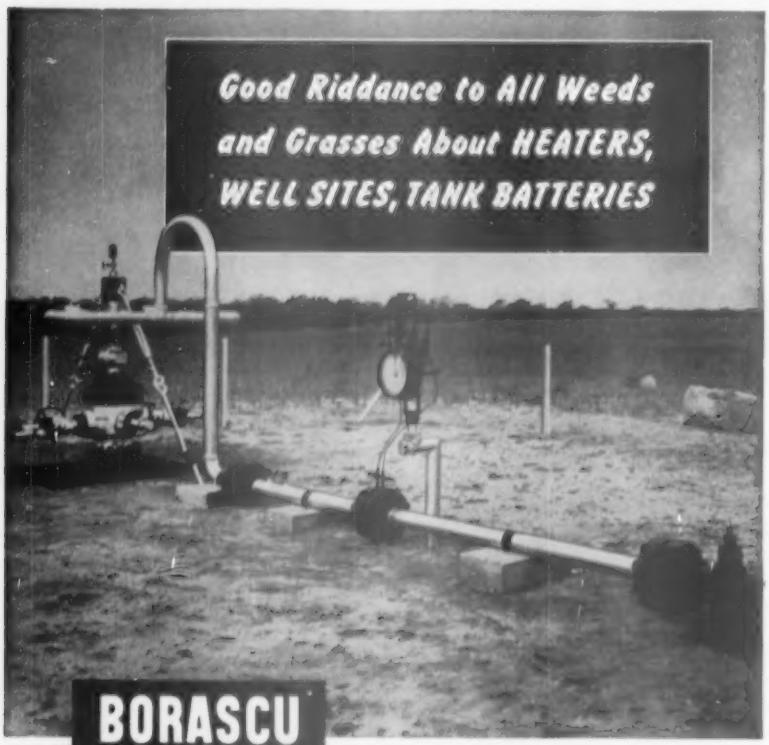
Lymburner will direct the sales effort of Canadian Aero, which is engaged in airborne magnetometer surveys for oil and minerals, scintillation counter surveys, and aerial topographic mapping. The company is affiliated with Spartan Air Services Ltd., Ottawa.

Taylor Rejoins Girdler to Develop New Catalysts

Dr. J. E. Taylor has rejoined The Girdler Co., Louisville, Ky., in the gas-processes division, according to Dr. R. E. Reitmeier, director of research and development. Taylor's major assignment will be the development and application of new catalysts.

Taylor received his Ph.D. degree from Ohio State University in 1927. He was, successively, in charge of hydrogenation research for Procter & Gamble Co., director of research for Girdler's gas processes division, associated with Manhattan Project at Columbia University, director of research for E. F. Drew & Co., technical adviser to Dodge Chemical Co., and with Markite Co.

The Girdler Co. is a division of National Cylinder Gas Co., Chicago.



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Glitsch Announces Changes In Sales Organization

R. W. ALLEN

R. W. Fowler, general sales manager of Fritz W. Glitsch & Sons, Dallas, fabricators of Glitsch Truss Type trays and other refinery equipment, has announced the following promotions in its sales department. R. W. Allen has been moved from district manager

J. J. TUNNO

B. A. ROSS

of Cleveland office to open the company's new Houston office. Allen, after joining the firm in 1949, was in the Chicago office prior to his establishing the Cleveland office. From Houston he will cover the Gulf Coast area, Texas, and Louisiana.

Julian J. Tunno, Tulsa district manager, has been promoted to head the Cleveland office which serves Ohio and parts of Canada.

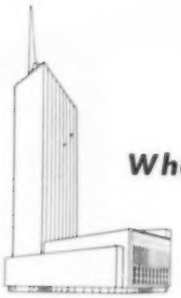
Bryan A. Ross has been appointed district manager, Tulsa office. He has been assistant to R. W. Fowler in Dallas since joining the firm.

Unit Rig Elects Three New Vice Presidents

J. T. TUCKER

At a recent meeting of the board of directors of Unit Rig & Equipment Co., Tulsa, three new vice presidents were elected, according to Paul Courtney, president of the oil-well drilling equipment firm. J. T. Tucker is now vice president in charge of sales; J. L. Vint, vice president in charge of engineering; and K. W. Patterson, vice president in charge of manufacturing.

Tucker joined Unit Rig in the summer of 1953 as general manager as sales. He moved to Tulsa from Texas where he had many years of experience



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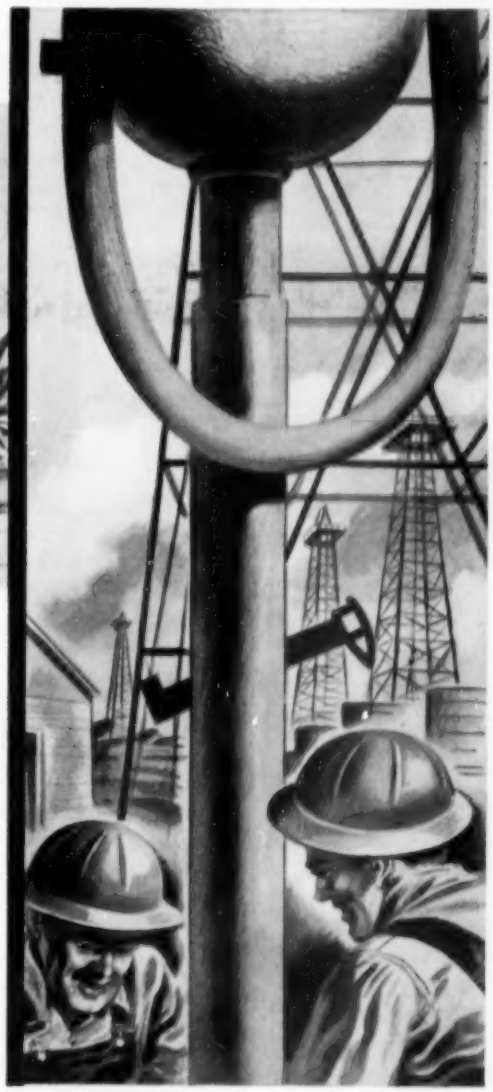

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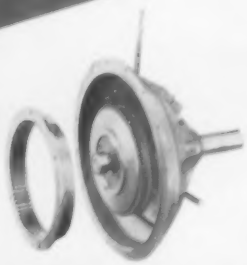
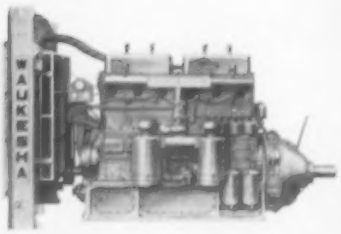


Twin Disc Clutches & Hydraulic Units



Waukesha Engines and Parts

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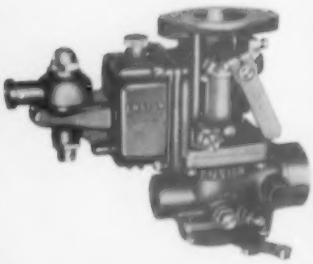
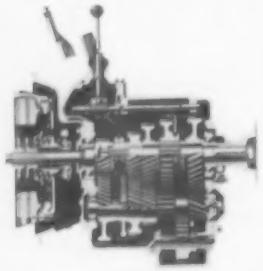
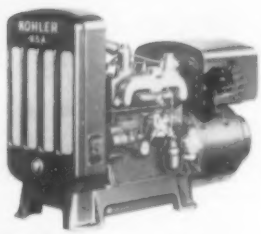
Bosch Magnetos



Zenith Carburetors



Spicer Transmissions and Parts



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in field service and general sales in oil-field equipment.

J. L. Vint has been Unit Rig's chief engineer and has served the company since 1947.

K. W. Patterson joined Unit Rig in

J. L. VINT

PATTERSON

May 1953 as assistant to the president, and has been associated with the manufacturing of both aircraft and oil-field equipment since 1941.

Gaso Names Power Pumps As Pacific Coast Distributor

Gaso Pump & Burner Manufacturing Co., Tulsa, has announced the appointment of Power Pumps, Inc., as Pacific Coast distributor for Gaso Pumps. Headquarters of Power Pumps, where complete stocks of Gaso pumps and parts will be maintained, are at Long Beach, Calif.

The new distributing company is headed by Ralph Abbott and associates. Abbott has had 15 years' experience in the oil fields of California, 13 of them as branch and area manager for Republic Supply Co. For the past 2 years he has been special manufacturers' representative, specializing in products used in the oil and pipeline industries.

Welex Expands Houston Area Facilities

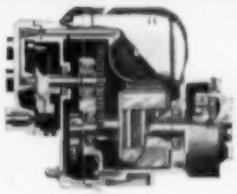
In a move to further improve its customer service in the Houston area, Welex Jet Services has expanded its facilities in Houston, J. B. Fleming, Gulf Coast division manager, has announced.

The new Welex building combines both the Gulf Coast division office and the Houston district office which were formerly in two separate locations.

"Welex activities throughout the Gulf Coast oil-production area are continually expanding," Flemming said. "Our new location and facilities enable us to provide better service to oil producers throughout the area." In adidtion to

ROUND the CLOCK OPERATION FOR YOUR PUMPING ENGINES IS ASSURED . . .

When they're equipped with Fairbanks-Morse Super Spark Magnetos



This is type FM-XOR six cylinder magneto with ball bearings throughout —available in base or flange mounting.

- Compact, rugged, self-contained unit—few working parts
- Steady hot spark at all speeds
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- Oversize high tension coils—built to take a beating
- Sturdy impulse coupling of simple design for easy starting
- Alnico Super Magnets cast into powerful one-piece magnetic rotor

Don't worry about ignition failures when your pumping engines are equipped with Fairbanks-Morse Magnetos—walk away and forget them—they'll keep on running day after day under the toughest oil field operating conditions.

Years of proven service in the oil fields attest to their superior performance and dependability.

Change now to Fairbanks-Morse Super Spark Magnetos. See your Fairbanks-Morse service station or write Fairbanks, Morse & Co., Magneto Division, Beloit, Wisconsin.

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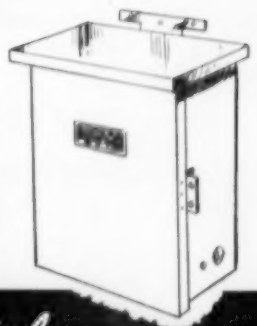
for oilfields and industrial installations...



The Twentieth Century Phasing Unit improves power factor and utilizes all the protective devices of a standard motor controller. It is easy to install and easy to maintain . . . costs less as compared to single phase motors. There is no need to stock both three phase and single phase motors as spares. Now you need handle only three-phase motors. The Twentieth Century Phasing Unit incorporates many protective all-weather devices thus permitting operation at all times.

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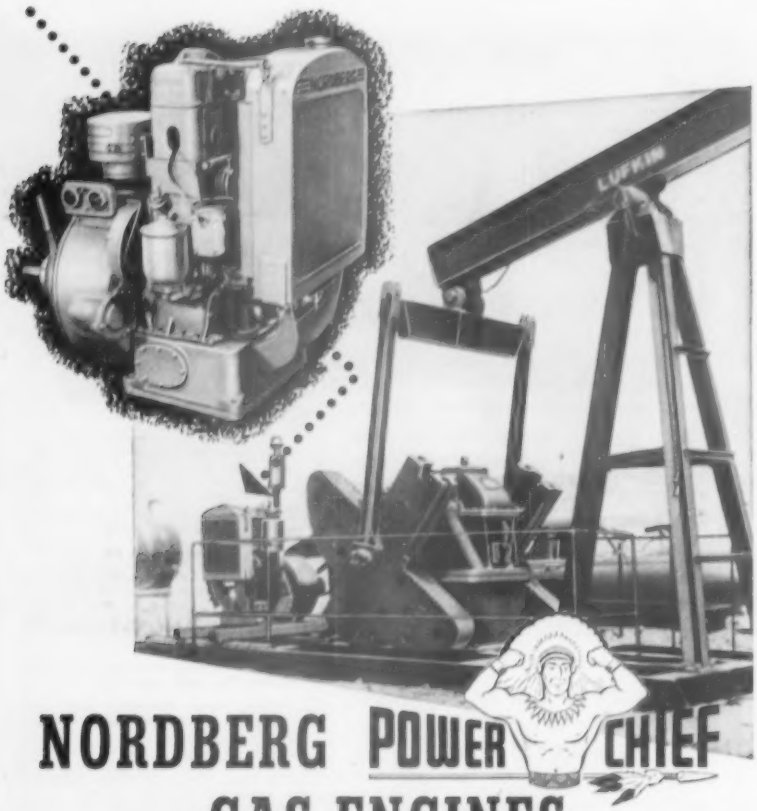

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GAS ENGINES
keep production on schedule . . .

Here's the low cost answer to compact, dependable power for 'round-the-clock production pumping—the new Nordberg *POWER CHIEF* Gas Engine. Backed by many years of service to the petroleum industry, this Nordberg engine is ruggedly built to keep production on schedule day-in and day-out, even under the most severe operating conditions.

Available as straight power units, rated 18 hp max., with stub shaft or clutch power take-off . . . and as "packaged" generator sets producing up to 10 kw, Nordberg *POWER CHIEF* Gas Engines are simple to install and easy to maintain —always ready and able to serve you 24 hours a day. Clip the coupon for full details.

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Houston Welex now maintains district service offices at Falfurrias, Tex.; Corpus Christi, Tex.; Beaumont, Tex.; Victoria, Tex.; and Lafayette, La.

Manager of the Houston district office is Ray Marshall.

Ethyl Names Bushell as New York District Manager

R. D. BUSHELL

Appointment of Redgnald D. Bushell as New York district manager of Ethyl Corp., has been announced by Harold Berg, general manager of antiknock sales.

Bushell joined Ethyl in 1938 as a junior engineer. Two years later he was promoted to field engineer and worked out of Buffalo and then New York City in that capacity. His most recent position was that of account representative in Ethyl's eastern region.

Chicago Pneumatic Opens District Office at Alice

E. K. GIGGY

Chicago Pneumatic Tool Co. has opened a new district office and warehouse at Alice, Tex. The office will be under the supervision of E. K. Giggy, district manager. T. J. Dacy will assist him.

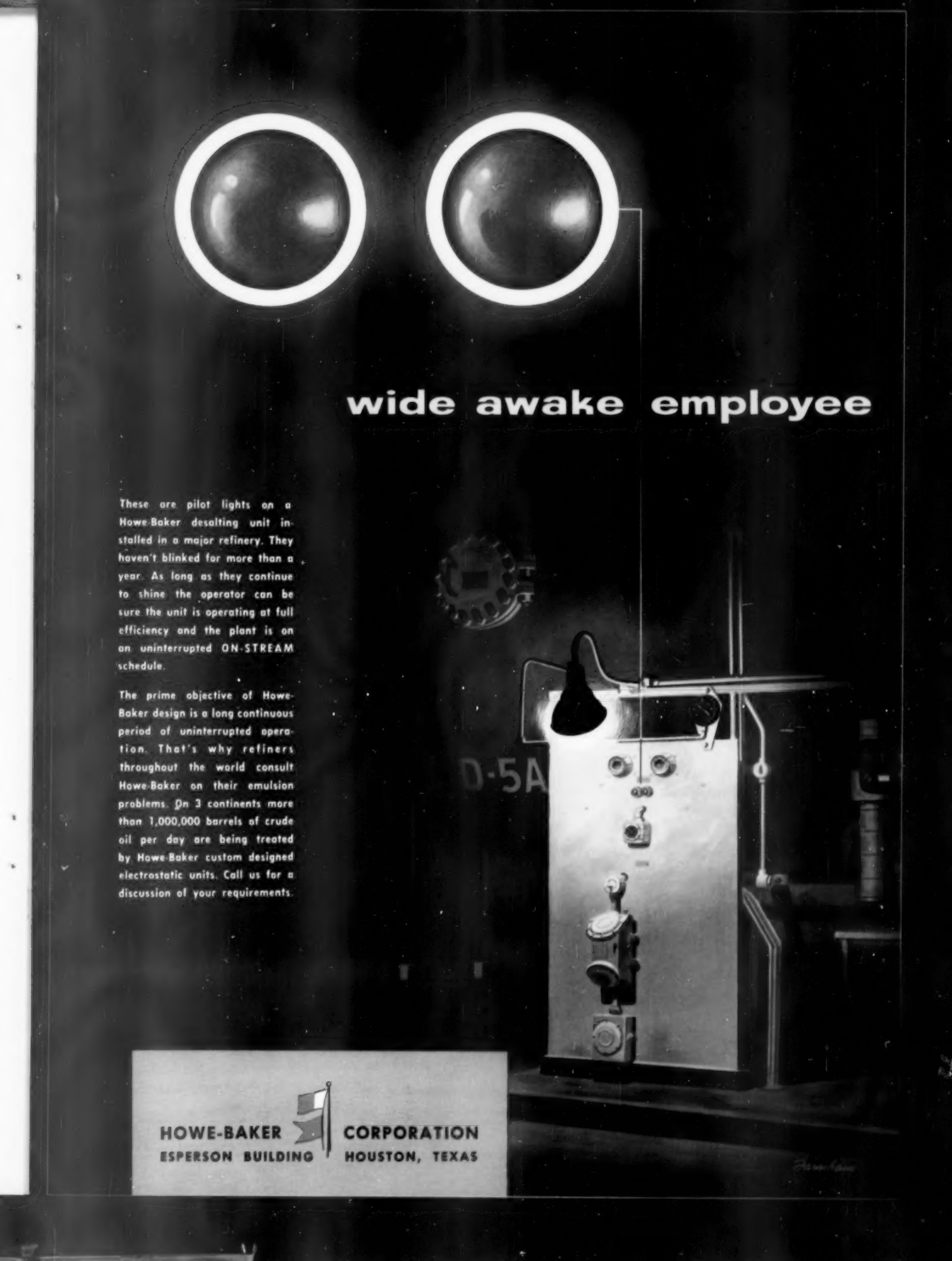
Prior to his appointment as district manager, Giggy represented Chicago Pneumatic in the Kermit, Tex., area for 9 years. Giggy acquired his early field experience as a driller in Kansas, Louisiana, and West Texas.

Coddington Is Manager of Alloy Tube for Carpenter

P. L. Coddington has been appointed manager of the alloy tube division of Carpenter Steel Co., Union, N. J. His appointment was announced by F. R. Palmer, company president.

Coddington has been assistant to the president at the firm's alloy tube division since August 1953. Prior to this he was manager of sales at the same division from 1945 to 1953. He has been active in the steel industry for more than 25 years, and before joining Carpenter he served with the iron and steel division of the War Production Board, in Washington.

wide awake employee



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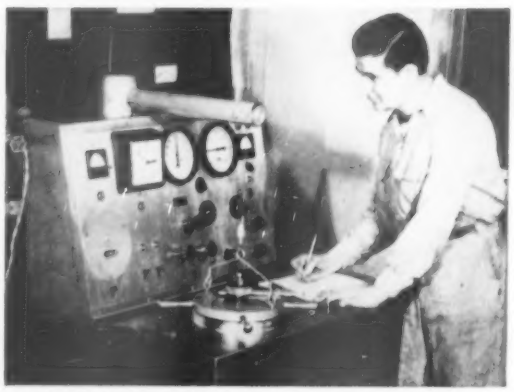

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EXPLORATION

S.W. Texas—Still More Oil...Mañana

by Frank J. Gardner

LIKE many another settled area of production, Southwest Texas has turned a corner in exploration for oil. What lies ahead for the oil seekers?

There are two directions they can look toward: one is northwest. The other is down. Deep down.

The map shows that they are doing both. The results haven't been very impressive so far, but the basis of discoveries to come is being built on new information acquired by drilling to new depths and in new places. It will be years before the upper reaches of the Rio Grande embayment and the far-flung Edwards Plateau yield the secrets of subsurface structure.

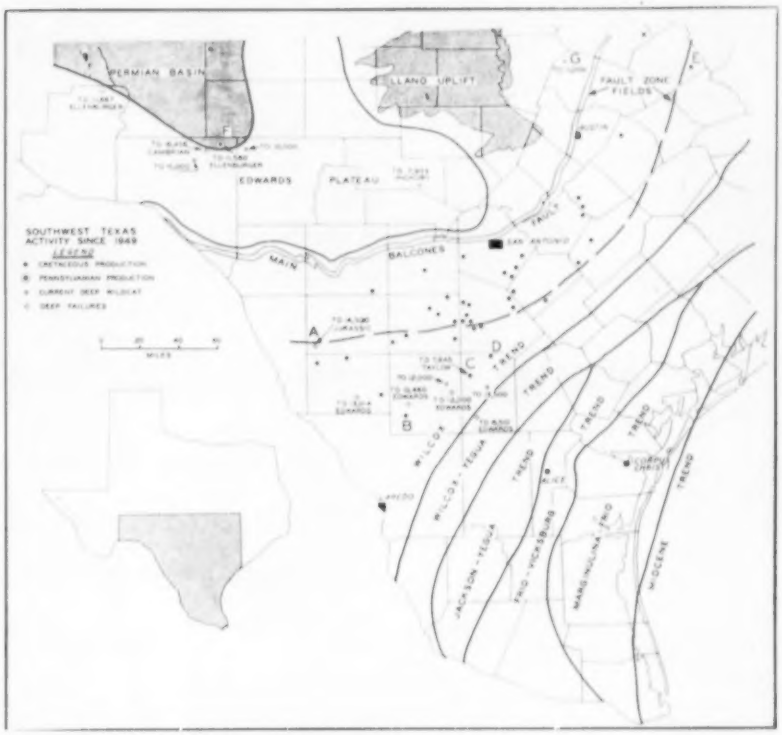
The effort . . . This is the land of siesta; its potentialities have emerged slowly, and it sometimes seems strange that 13 years could elapse between the discovery of Darst Creek fault field in 1929, and the next fault discovery at Imogene in 1942. The snaillike pace with which the Agua Dulce-Seeligson area was developed to its fullest significance is strange, but it is no stranger than the present-day lag in exploration of the Edwards Plateau region and of the Lower Cretaceous Glen Rose fault trend.

Discoveries have been made, of course, but some of the dry holes possess greater importance than the producers. The round black dots on the map indicate Cretaceous fields discovered during the past 5 years; most of these fall within the zone of previous fault traps, but some lie farther southeast, and these are the harbingers of things to come.

The discoveries . . . The letters on the map designate those wells that are pertinent to Southwest Texas' eventual course in the search for new reserves of oil and gas.

At A, Shell Oil Co. discovered a secret—Jurassic nonfossiliferous red beds at 14,500 ft.; although it was dry, the 1 Plumly, drilled in 1953, penetrated the entire Cretaceous section and found porosity in the Glen Rose.

At B, in February of this year, Stanolind Oil & Gas Co. discovered a field, called Stuart City; producing gas and condensate from the Edwards lime at 10,096 ft., it represents the southernmost occurrence of Lower Cretaceous production in the state.



Future oil reserves in Southwest Texas lie in three directions: the fault zone, the Rio Grande embayment, and the Edwards Plateau.

At C, H. R. Smith et al discovered both a secret **and** a field—an interior piercement salt dome, unexpected this far inland. The well was drilled as a Cretaceous test, but at 7,645 ft., it went out of the Taylor marl into salt, and found salt all the way to total depth 8,088 ft.

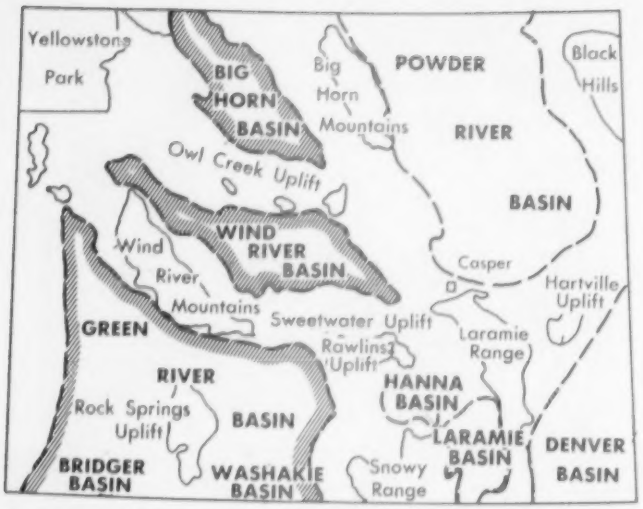
At D, Humble Oil & Refining Co. opened an Edwards gas reservoir at 10,149 ft. with its 1 Gubbels in the shallow San Miguel field; a flow of 70 million cubic feet established the first Edwards field this far coastward.

At E, a significant dual gas discovery was made in 1953 at D. H. Byrd 1 Greene in the old Gause field of Milam County, to establish the first commercial production from the Rodessa and Pettit (Lower Cretaceous) in this part of Texas.

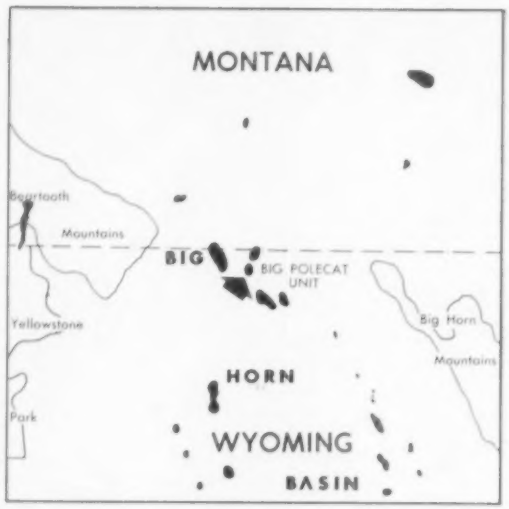
At F, deep Pennsylvanian gas was discovered with the opening of Vinegarone field in 1951; the Strawn lime at 10,050 ft. provided evidence that the southeastern limb of the Permian basin could be expected to give up more deep Paleozoic oil and gas.

Today, at G, an active deep test in northwestern Williamson County is causing great excitement. Shell 1 Purcell topped the Ellenburger formation at 6,930 ft. and reportedly found showings of oil and gas between 6,950 and 7,400 ft.

The promise . . . If you study this map, at least three things stand out in relief: (1) the untold possibilities of the Lower Cretaceous yet to be revealed, especially in the Glen Rose and Edwards; (2) the probability of a great expansion of productive trends in the interior of the Rio Grande embayment, and (3) the Paleozoic promise of the Edwards Plateau country.



INTERMONTANE BASINS of Wyoming. The Wind River, Big Horn, and Green River basins each report significant strikes this year. Fig. 1.



THE RECENT TENSLEEP discovery at Big Polecat Unit is one of the year's best in the Big Horn basin. Fig. 3.

Wyoming Leads in Rockies Interest

- **Cumulative 1954 total completions, 898**
- **1954 discoveries, 34**
- **Current daily oil production, 245,800 bbl.**

by John C. McCaslin

THERE are big things going on in Wyoming this year. The state may be the oldest and largest producer in the Rocky Mountain region, but it is certainly no sleeping giant. The big state has put on the record a very impressive list of new discoveries this year, keeping it well out in front in the Rocky Mountain exploratory race.

During the past few weeks three discoveries of major importance to future drilling in the Wind River, Big Horn, and Green River basins have been watched with keen interest by the industry.

Wind River Basin

Perhaps the biggest of the three new strikes in Wyoming is the Grieve Unit Cretaceous sand hit made by Forest Oil Corp. in Natrona County, 35 miles southwest of Casper on a 25,000-acre unit (See Fig. 2).

Forest recovered oil at rates up to 100 bbl. per hour at the 22-1 Morton from what has been identified only as a Cretaceous sand. From the interval 6,768-80 ft. the operator recovered oil at the rate of 1,215 bbl. per day. This was the third test to recover oil at high flow rates. The oil is about 36° gravity. More than 68 ft. of saturation has been established at the wildcat, which is projected to the Tensleep (Pennsylvanian).

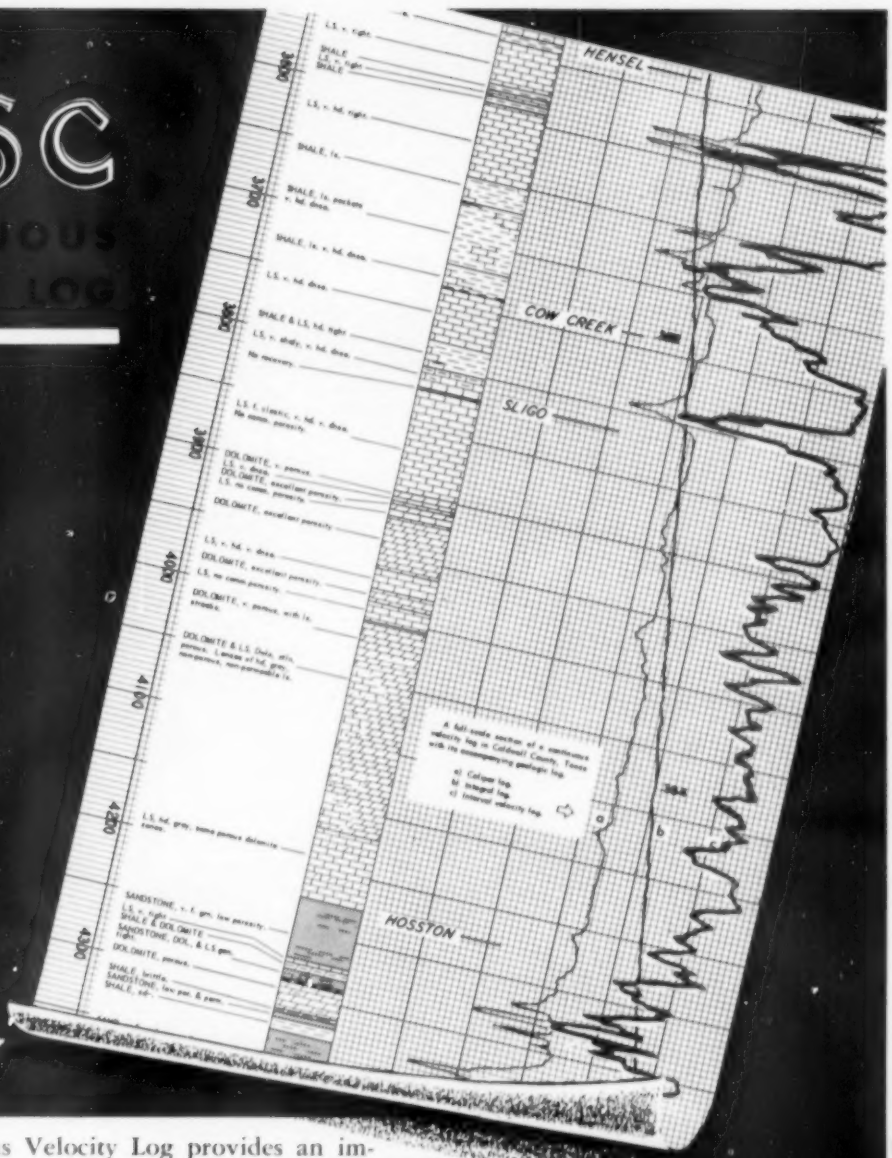
The Grieve Unit is located southwest of West Poison Spider field where Cretaceous sands are productive. Despite its nearness to Casper, the center of years of important drilling activity along the southern and southwestern rims of the Powder River basin and the southeastern corner of the Wind River basin, the immediate area around the unit has experienced little drilling.

Upper Cretaceous Mesaverde and Frontier production is known in the Poison Spider fields. Jurassic Morrison production was tested noncommercial at a deep West Poison Spider test a few years ago at 16,605 ft. There is also some Lakota-Lower Cretaceous production at Fish Creek, 6 miles southeast of the Forest discovery. The possibility that the Cretaceous sand at the Grieve Unit strike might be Mesaverde has aroused considerable interest in Wyoming circles. The Mesaverde sand

AN IMPORTANT CRETACEOUS sand discovery was made recently at the Grieve Unit by Forest Oil Corp. In the southeastern corner of the Wind River basin in an area of little previous drilling. Fig. 2.

SSC

CONTINUOUS
VELOCITY LOG



A Continuous Velocity Log provides an improved method to aid the geophysicist in identifying seismic reflecting horizons and in determining their depths. Direct measurement is made of the interval velocity and the average velocity of the interval logged is obtained by integration.

These logs reflect lithology and provide the geologist a new physical parameter for correlating subsurface formations.

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has been a much soughtafter objective in the Green River basin and northwestern Colorado during the past 3 years, as well as other north-central Rocky Mountain areas.

Structural environment . . . The general structural and stratigraphic features of the Wind River basin are fairly well known. However, there remains much to be learned about this geologically complex intermontane basin.

The basin lies between the Big Horn and Green River basins. It is well defined by uplifts and escarpments except on the east side. The oil fields on the east side of the basin are found on small separate closures superimposed on a major asymmetrical anticlinal fold that trends northwest-southeast just to the west of the line of folding and faulting between the Laramie and Big Horn mountains.

The Wind River basin is the third largest oil producer in Wyoming. Production is found in the Cretaceous, Triassic, Jurassic, Permian, Pennsylvanian, and Mississippian.

Big Horn Basin

The Big Horn basin recorded a potentially important discovery on the Big Polecat structure in Park County with recovery of oil from the Tensleep. (See Fig. 3).

Mule Creek Oil Co. 1 Big Polecat Unit penetrated about 125 ft. of Tensleep sand, apparently productive, and made as much as 2,000 ft. of oil on drill-stem tests of the zones within the Tensleep. On the first test the operator swabbed oil at the rate of 470 bbl. per day. The same operator has spudded the second well about 1 mile southeast on the same structure.

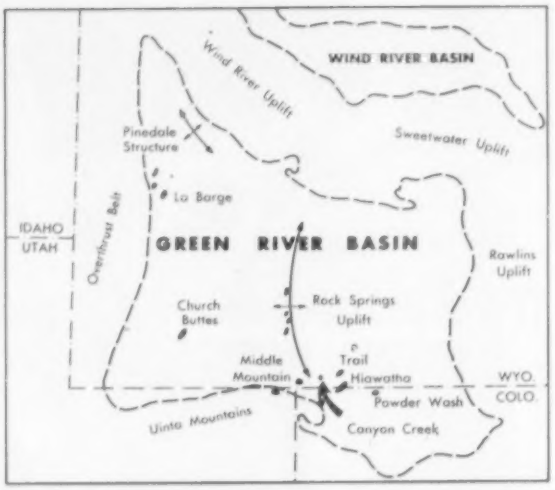
Cores recovered from the Tensleep were reported to have an average porosity of 12-15 per cent, and an average permeability of about 185 md. The well is reported to be 100 ft. higher structurally than a previous Tensleep test on the north end of the Big Polecat structure where water was recovered.

Location for the wildcat was made with seismic information. It is about 2 miles north of depleted gas production from the Frontier in Little Polecat field. Deeper drilling in the latter field found water in the Tensleep. Big Polecat itself produces Cretaceous gas.

Structural environment . . . The Big Horn basin is a well-defined topographic and structural depression in the northwestern part of Wyoming.

With few exceptions the fields in the basin are restricted to the basin edges on a series of satellite anticlines. There are two prominent lines of surface-expressed folding within the basin which include well-defined anticlines roughly paralleling the border of mountain ranges. Some fields in the basin have been located by seismic work in recent years.

The basin is an area of big production in Wyoming. It produces more than 50 per cent of Wyoming's total output of oil and 30 per cent of that of the entire Rocky Mountain region. The basin includes an area of only 3,000 square miles. Production is found in the Cretaceous, Triassic, Jurassic, Permian, Pennsylvanian, and Mississippian. Very few tests have been made in pre-Mississippian rocks in the basin, leaving these wide open for future exploration. The Tensleep is one of the basin's leading producers.



A RECENT MESAVERDE gas discovery at Canyon Creek and gas shows on the great Pinedale anticline have given the most promising basin in the Rocky Mountains, the Green River, a real boost. Fig. 4.

Green River Basin

The Green River basin is rapidly gaining in exploratory interest in the Rocky Mountain region. It is the least-explored and most promising basin in Wyoming. (See Fig. 4).

The third important discovery in recent weeks in Wyoming is Mountain Fuel Supply Co.'s Canyon Creek Unit strike in Sweetwater County, center of the basin's Mesaverde exploratory activity. The apparent Mesaverde gas strike, just 12 miles east of Middle Mountain production, recovered gas at the rate of 10,000 M.c.f. per day at about 5,500 ft. This is the third well drilled on this unit. Previous tests on the unit had Mesaverde shows, but were completed dry.

Mesaverde . . . The Mesaverde sand has been the objective of wildcat activity in the Green River basin since the discovery at Middle Mountain and Trail units about 3 years ago. It is a gas-producing sand that will certainly gain in interest in the coming months.

Earlier this year The Texas Co. tested gas at the rate of 8,980 M.c.f. per day at 5 Unit in the Table Rock Unit of Sweetwater County. The deep test was the first to the Mesaverde in this unit. Previous production had been from Tertiary rocks. Another Mesaverde discovery was completed by Carter Oil Co. in Carbon County at the 1 Savery Unit. Moffat County in northwestern Colorado has also figured in the Mesaverde play in recent months.

Geologic sketch . . . The Green River basin is a structural and topographic basin in southwestern Wyoming.

The biggest single structure in the Rocky Mountains, the Rock Springs uplift, is located near the center of the Green River basin. It is a north-south trending anticline. Due to this centrally located uplift, the thickest sedimentary sections of the Green River basin are located near the bordering uplifts. Very little is known of pre-Mesozoic rocks in the basin except on the Rocky Springs uplift due to the great thickness of sediments.

Pre-Tertiary rocks in the basin are found at depths of 5,000 ft. or more except on the flanks of the Rocky Springs uplift. There are several large areas in the basin where oil and gas-producing sands of Tertiary and Upper Cretaceous age can be reached at moderate depths. Interest in these areas is high.

New excitement . . . The latest good omen for the future of the Green River basin is the proposed Pacific Northwest Pipeline, running from the San Juan basin to the Puget Sound area of the Pacific Northwest. This pipeline will pass right through the Green River basin.

This prospective pipeline has already spurred exploratory activity along its long route. El Paso Natural Gas Co., Continental Oil Co., and Malco Refineries are drilling the great Pinedale anticline of Sublette County to a depth of 15,000 ft. Carter Oil Co. is drilling a 6,000-ft. wildcat on the Carson Peak

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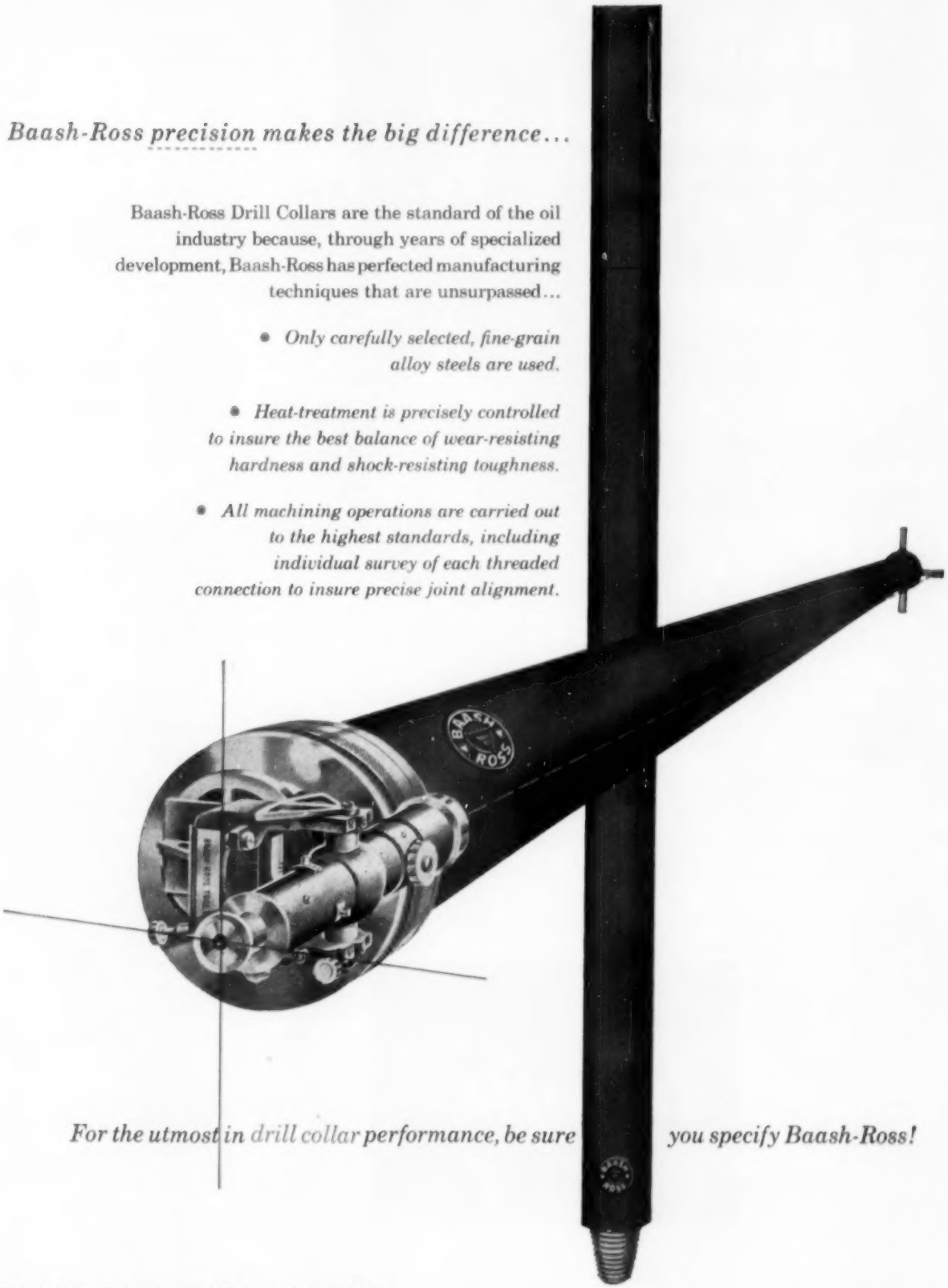

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structure in Daggett County, northeastern Utah.

Gas shows have been reported from the significant Pinedale Unit wildcat by El Paso et al. Tests were taken at 7,000-7,500 ft. in Tertiary rocks. The Pinedale is one of the most important wildcats ever to be undertaken in the northern part of the Green River basin. Successful completion of this wildcat will brighten the basin's future prospects immeasurably. The Pinedale anticline is one of Wyoming's largest structures. It was recently unitized by El Paso Natural Gas Co. for the second time.

All exploratory eyes will be on the Green River basin in the coming months. The basin is thought of as a possible rival to San Juan basin gas production. The Mesaverde sand will be the target of many important tests coming up.

OKLAHOMA

Wet Gas Flows on Test At New Woods Prospect

J. R. McDermott 1 Murrow, C SW NE 19-27n-16w, looks like a new wet gas strike for one-field Woods County in northwestern Oklahoma. The wildcat tested Mississippian perforations at 5,750-80 ft.

After acidization the wildcat flowed 7,000 M.c.f. of gas per day on 1-in. choke. More acid caused the well to flow 7,800 M.c.f. per day. During a 6-hour test on a 24/64-in. choke the well flowed 4,586 M.c.f. per day, a 32/64-in. choke on 6-hour test flowed 4,650 M.c.f. per day, and on 48/64-in. choke it flowed 4,714 M.c.f. per day. The discovery is shut in at present.

Nearest production and the only field in the county is Yellowstone pool, one of 1953's exploraory highlights.

MICHIGAN

All Trenton-Black River oil wells in Northville pool, Washtenaw County, and surrounding area, were placed on an emergency proration order by Supervisor of Wells Gerald E. Eddy at 7:00 a.m., August 30.

Wells are restricted to not more than 200 bbl. of oil per well per 24-hour day. The order, by law may be left in force on an emergency basis for 21 days. A public hearing is scheduled to be held in Lansing, September 17, after which time the order will probably be made permanent. The order was issued . . . "Because of possible present physical waste and the imminent danger of further physical waste." At the time the order was issued, there were two wells in the pool capable of producing the 200-bbl. a day oil allowable.

Another new Trenton-Black River oil producing well was being completed on the west side of Northville pool this week. Well was being completed at 4,500 ft., total depth, in the so-called "Nerreter" pay horizon, below a shale break and possibly in the Black River horizon. This new producer, which flowed over the crown block and was then shut in

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when pay was tapped, was the David J. Shiffman 1 Dolan Brothers, NE NE SE 2-1s-7e, Salem Township, Washtenaw County. Top of Trenton was logged at 4,032 ft. Well was being tubed in preparation for controlled testing. The 1 Dolan Brothers is the approximate south offset to the Edward Torosian 1 Nerreter, first well to be completed in this second pay horizon and the first producer in Section 2-1s-7e.

The Taggart Co. 1 Terrill-Thayver et al, SW NE SW 7-1s-8e, Northville Township, Wayne County, most southeasterly Trenton well to be completed in the pay, was being drill-stem tested in the Trenton at 4,066 ft. September 4. Gas showed to the surface in 6 minutes, estimated at 500,000 cu. ft. Test, just started, was scheduled to be run for 8 hours. It was believed that testing tool might be filling up with oil. Top of Trenton was logged at 3,866 ft.

APPALACHIAN AREA

OHIO

C. A. Baird et al 1 Arthur Pennick, Lot 27, Washington Township, Coshocton County, the first offset and ½ mile to the west of the discovery, gaged 1,000,000 cu. ft. natural from the second Clinton at 3,451-3,470 ft.

An oil pool near Mt. Pleasant in Washington Township, Hocking County, is confirmed by the J. G. Swartz 1 Harry Stone, Section 34. Clinton was topped at 2,763 ft. and drilled in to 2,794 ft. with 17 bbl. natural. The test has not yet been fractured. Previous to this time, one producer and several dry holes had been drilled in the area.

PENNSYLVANIA

Monroe Township, Bedford County, Southwest Pennsylvania, John Galey 1 Donald Miller, is drilling at 5,073 ft. Parker Township, Butler County, Walker et al 1 John Walker, is at 5,285 ft. Connellsville Township, Fayette County, Peoples Natural Gas Co. 4030, F. K. Buttermore Hrs., is drilling 7,850 ft. Salt Lick Township, Mid Atlantic Oil & Gas Co. 1 Adolph Dupre, at 5,625 ft. Grant Township, Indiana County, Fairman Drilling Co. 1 Herb Gernandt, is fishing at 5,365 ft., and in Pine Township, Fryer & Hansen 1 Lucinda Mitchell at 7,565 ft. Gaskill Township, Jefferson County, Fairman Drilling Co. 1 Clair Reed, reached 5,310 ft.

WEST VIRGINIA

In Beaver Pond district, Mercer County, West Virginia, United Fuel Gas Co., rank wildcat 1-8010 Edward Combs, was dry, elevation 2,756 ft., Weir sand. TD 3,266 ft.

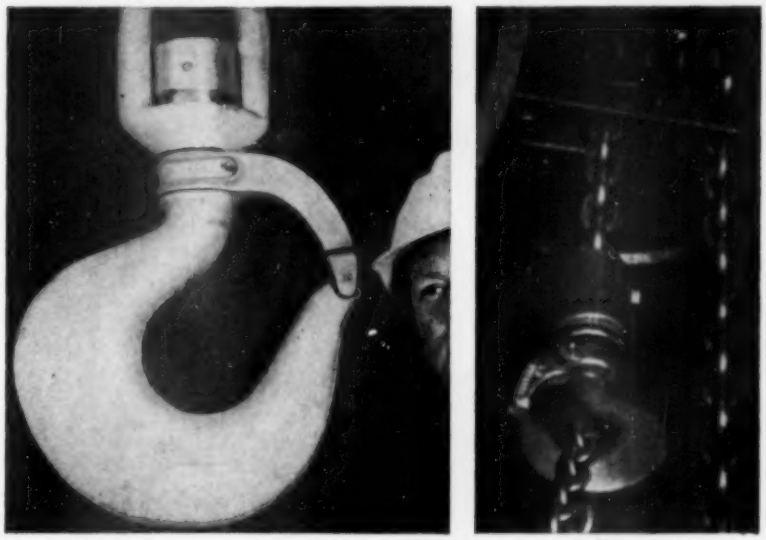
CANADA

Discovery Reported At Buffalo Lake Location

A moderate flow of natural gas and some very high-gravity crude oil has been discovered by Sinclair Canada Oil Co. and Banff Oil, Ltd., at their exploratory driller in the Buffalo Lake area of northwest Alberta, about 20 miles northeast of Grande Prairie and 90 miles southwest of Peace River town.

The find, made in the Permo-Pennsylvanian formation, came at Sinclair-Banff 1 Buffalo Lake-Crown well, which is on LSD 7, 26-74-8w6. It is 8½ miles west of the Sinclair-Banff team's Sexsmith 1 Crown Dunvegan

PROTECTION – WHERE ACCIDENTS BEGIN



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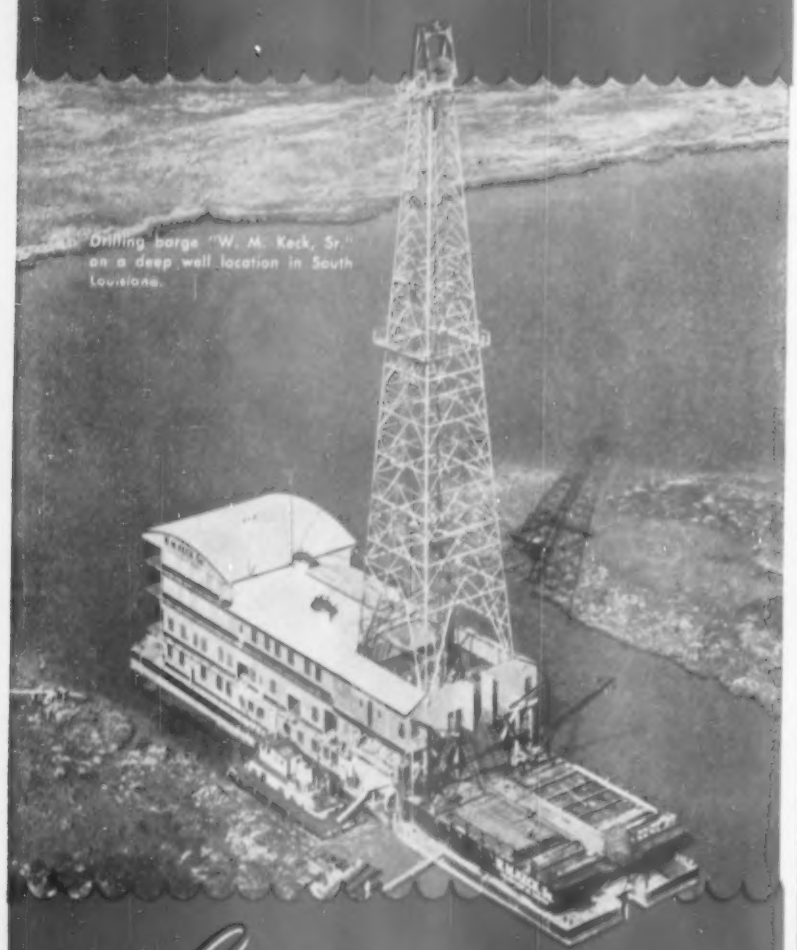

Drilling barge "W. M. Keck, Sr." on a deep well location in South Louisiana.

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formation gas discovery well, 7 miles south of Royalite-Fina 2 Saddle Hills wildcat abandonment, and 8½ miles south-southeast of Royalite-Fina 1 Saddle Hills gas discovery well.

The Permo-Penn was topped at 7,288 ft. (ground elevation 2,523 ft.), and crew ran a 65-minute drill-stem test from 7,690 to 7,720 ft., using a 1,000-ft. water cushion. Natural gas reached the surface in 30 minutes, at rate 500,000 cu. ft. daily, and recovery was 300 ft. of 49°-gravity oil, no formation water. Drilling is now proceeding below 7,840 ft.

Hillsdown area . . . A wildcat in the Hillsdown area of central Alberta, about 4¾ miles west of Joffre Viking oil field and 5 miles east of Red Deer has struck a small gas flow and discovered some crude oil in the D2 zone of Devonian.

The exploratory well is Seaboard-Canadian Superior 14-17 Hillsdown, LSD 14, 17-38-26w4, which is 3¾ miles south-southeast of the Imperial-Red Deer 5-5 well that discovered Viking oil and 13 miles south of Lacombe.

D2 Devonian was contacted at about 7,160 ft., or 3,783 ft. subsea (K. B. elevation 3,287 ft.), and 110-minute drill-stem test was run in the interval 7,183 to 7,213 ft., using a 1,240-ft. water cushion. Natural gas flowed in 70 minutes, at rate 150,000 cu. ft. daily and pipe recovery consisted of 200 ft. of oil and 40 ft. of oil-cut mud. Crew is currently continuing to core.

Until further coring and testing has been carried out in the D2 porosity, it is not possible to determine whether or not this find will be commercially productive, however, even at this stage it is classed as a significant strike. The well, under terms of the farmout agreement, is scheduled to be taken down to test D3 reef prospects.

HUGOTON EMBAYMENT

Beaver Morrow Discovery Area Gets Major Extension

United Producing Co.'s 1 Barby, NE SW 36-5n-25eCM, 12 miles northeast of Beaver, Beaver County, Oklahoma Panhandle, is a long extension and confirmation well to The Texas Co.'s 1 Barby "A," Morrow gas discovery completed earlier this year.

The 1 Barby tested an estimated 10,000 M.c.f. of gas per day from perforations at 6,894-6,920 ft. in the Morrow sand.

Greenwood Oil Production Confirmed in Morton Well

The southeast offset to the only oil producer in big Greenwood gas field, Morton County, southwestern Kansas, has confirmed oil produtcion in the area.

The confirmation discovery is J. M. Huber Corp. 2 U.S.A. "C," SE SW 29-34s-43w. Production is from the Morrow sand. Completion is in progress. The oil discovery well in the field, which also opened first oil production in Morton County, was the 1 U.S.A. "C."

Grand Valley Field Has Third Well Testing

The third producer for Beaver County, Oklahoma Panhandle's new Grand Valley

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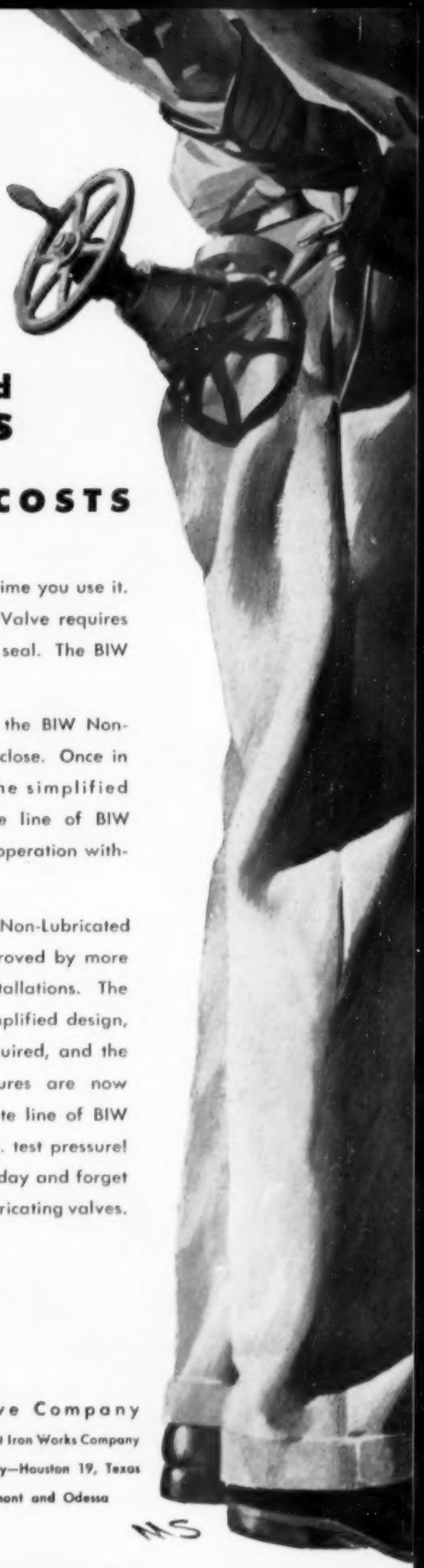

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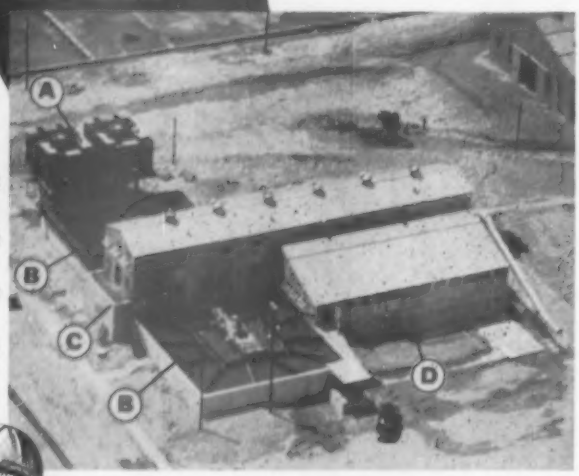

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field is testing. It is United Producing Co. 2 Harrison, NE NE SW 30-2n-20eCM.

The well flowed 16,500 M.c.f. of gas per day from the Morrow sand after fracture. It then flowed a calculated 38,500 M.c.f. per day. It is the 1½-mile northeast extension to United 1 Sillars, 3-mile northeast extension to Camrick gas production.

TEXAS

WEST TEXAS

New Spraberry Oil In Southwestern Borden

Phillips Petroleum Co. 1 Quartz, 15-33-T4N-T&P, has opened another Spraberry pool in southwestern Borden County. Initial potential was 864 bbl. of 35° oil a day, based on a 6-hour gage of 216 bbl. through ½-in. choke. The well also made 35 bbl. of water on the same test. Tubing pressure was 350 psi. Production was from perforations between 7,200-50 and 7,268-7,346 ft. which had been treated with 1,000 gal. of mud acid.

Location of 1 Quartz is approximately 2 miles southwest of J. E. Jones 2 Miller in Section 12, Spraberry discovery of Jo-Mill pool, which found top of pay at 7,095 ft. and completed for 348 bbl. of oil a day from 50 ft. of perforations.

Phillips 1 Quartz also swabbed 3 bbl. of oil with 81 bbl. of salt water in a Pennsylvanian reef around 8,500 ft. Four miles to the northeast, Falcon, Seaboard et al 1 Clayton and Johnson had discovery production in Pennsylvanian reef at 8,236-40 ft.

Crockett County . . . Bankline Oil Co. and Hurt Oil Co. had production assured at 1-A Forristall, north offset to their discovery of East Tippett field. A drill-stem test in the Wolfcamp detrital from 5,912-74 ft. had oil at the surface in 11 minutes and made an average flow of 86.3 bbl. an hour with no water. Second test, from 5,974-94 ft., had oil in 5½ minutes and flowed at the rate of 91 bbl. an hour with no water.

Andrews County . . . Skelly Oil Co. has announced plans for a 14,000-ft. Ellenburger wildcat, 5½ miles southwest of Magutex-Ellenburger field and about 3 miles northeast of Continental Oil Co.'s Ellenburger pay discovery in Wemac-Wolfcamp field. The new well will be 1 Frank Orson, in 27-3-PSL Survey.

NORTH TEXAS

Deep Well Planned For Nolan County

Nolan County was in line for an 8,000-ft. wildcat, to be drilled 7 miles west of the town of Maryneal, and 3½ miles southwest of American Trading & Production Co.'s 1 Farrar, 1950 dry hole at 7,519 ft. The projected test is Choya Drilling Co., Inc. 1 Lance Sears, located in Section 151, Block 1A, H&TC Survey. Projected depth for 1 Sears should test the Cambrian section, since 1 Farrar went into the Ellenburger at 7,342 ft., on elevation of 3,593 ft.

Humble Oil & Refining Co. 2 Petty, Section 6, Block Z, T&P Survey, approximately 1 mile north of Cambrian producers, has been completed as the second well for E. A. (Ordovician) field.

No. 2 Petty, a north offset to the field discovery in that pay, flowed 530 bbl. of oil a

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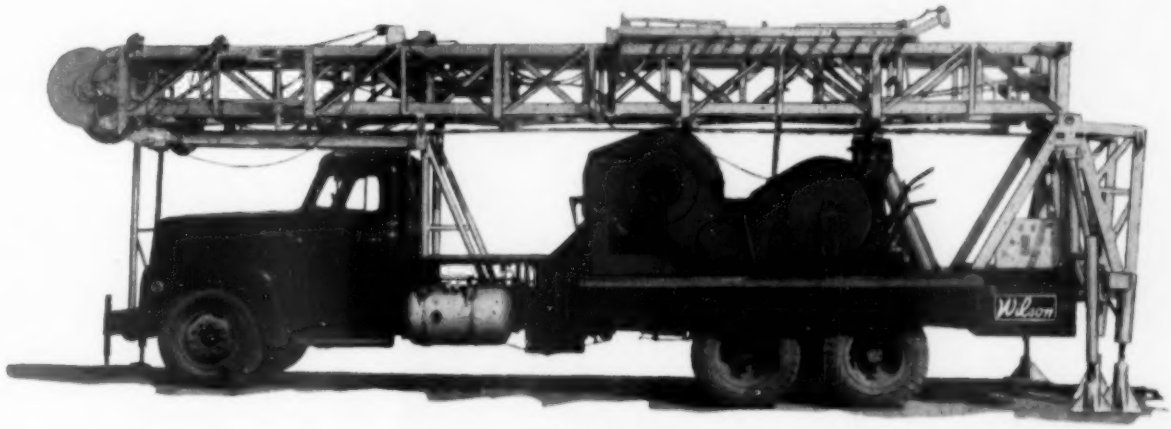

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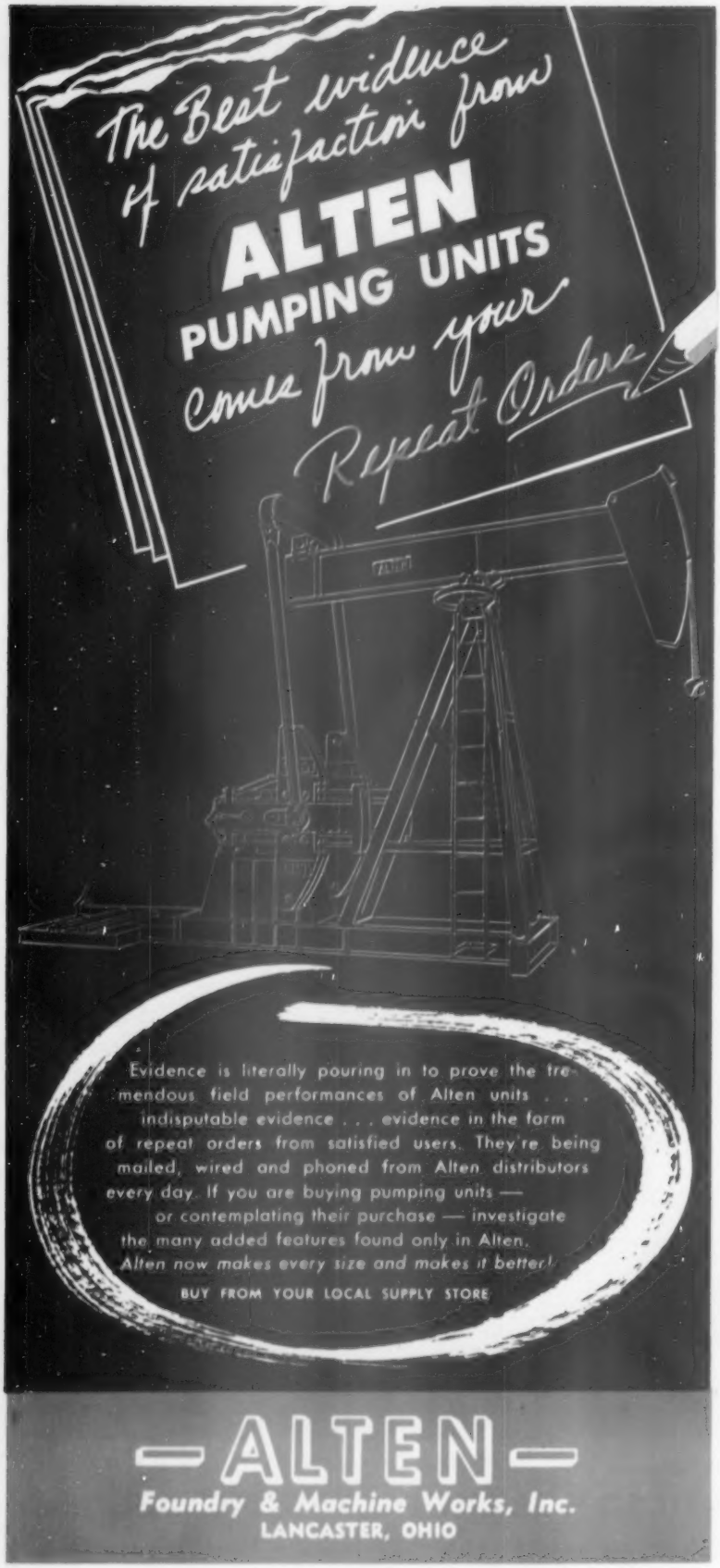
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day through ¼-in. choke, from pay between 6,117-55 ft. Gas-oil ratio was 318 cu. ft. and gravity was 46°.

Montague County . . . New production in the Bend conglomerate was assured last week at Arnold H. Bruner & Co. et al 1 McCall-Fooshee, wildcat 1½ miles north of production, and 3½ miles northwest of Montague.

According to field reports, the well flowed an estimated 50 bbl. of oil an hour on drill-stem test from 6,288-96 Gravity was 42°. Operators wer pulling tubing at last report, with the well unloading oil.

TEXAS GULF COAST

Wharton County Wildcats Find New Oil Production

A new oil discovery, located in a fault block between the Lane City and Prasifka fields, in southeastern Wharton County, has been made by Smith & Smith.

The discovery well, 1 Cockburn, in Block 6, S. Castleman League 5, flowed at the rate of 139.21 bbl. of 23.9°-gravity oil per day through 8/64-in. choke with 800-psi. pressure and gas-oil ratio of 581 cu. ft. per barrel. Pay interval is 5,448-52 ft.

Location is 1,700 ft. from nearest production at Lane City, to the northwest, and 2,000 ft. from Prasifka production.

Louise discovery . . . Caribbean Oil Corp. has completed its 1 Stovall, 5 miles southeast of Louise and east of the south tip of Louise field, in western Wharton County, with potential flow of 92.5 bbl. of 27.8°-gravity oil per day through 8/64-in. choke. Tubing pressure gaged 480 to 500 psi., and gas-oil ratio 418 cu. ft. per barrel. Pay interval is 5,454-56 ft. Tentative designation of the area is Lou Hill field.

Oil Production Indicated In Splendora Area Test

Indications of oil production in the Splendora area, in eastern Montgomery County, have been given in a drill-stem test by U. S. Epperson Underwriting Co. at its 3 Southland, located 934 ft. southeast of the area's discovery well (1 Southland), shut-in gas-condensate producer.

The drill-stem test was made in Cockfield sand, taking in the interval at 5,960-70 ft. Open through ¼-in. chokes, gas was at the surface in 15 minutes, and oil in 33 minutes. Tester was closed after 38 minutes, recovering 1,000 ft. of oil with 210 ft. of mud-cut salt water. Bottom-hole flowing pressure gaged 2,250 psi.

Prior to the test, gas sand had been cored at 5,942-58 ft., and oil sand at 5,958-68 ft. The indicated pay has been passed up for the time being with hole now drilling toward its original 10,000-ft. objective.

The area's discovery, and so far only successful well, was rated good for 10,000,000 cu. ft. of gas per day with condensate recovery at 12 bbl. per million cubic feet. It has been shut in since completion. Its completion was in the 5,950-ft. zone. The operator's second well, nearly ¾ mile southwest of the discovery well, was a failure.

SOUTHWEST TEXAS

Starr County Discovery Yields Gas-Condensate

Flow of Blair-Vreeland 1 Bentsen, new discovery well 25 miles northeast of Rio Grande

City, in Starr County, was gaged at the rate of 10,500,000 cu. ft. of gas and 66 bbl. of 65°-gravity condensate per day on open-flow potential test. Production is from Frio sand at 4,906-14 ft. Hole was drilled to 6,294 ft. The well is shut in with pressure of 1,787 ft.

Second Test Confirms West Alice Discovery

The recent oil discovery 3 miles west of Alice, in Jim Wells County, and designated as West Alice field, has been confirmed in the area's second test, northeast offset to the discovery well.

The confirmation well, L. M. Lockhart 1 Polk, producing from the same zone as the discovery well, with perforations at 4,599-4,606 ft., flowed 107 bbl. of 38.7°-gravity oil per day through ⅜-in. choke under pressure of 435 psi. Gas-oil ratio was 246 cu. ft. per bbl.

The discovery well, Tsesmelis & Dunn 1 Perkins, was completed as a pumper, making 135 bbl. of oil per day with perforations at 4,597-4,612 ft.

CALIFORNIA

Belgian Anticline Field Extended Nearly Mile

Production in Belgian Anticline field in Kern County has been extended almost 1 mile to the northwest by Ohio Oil Co.'s 1 F. E. Smith outpost in 23-30s-21e. On a formation test of the interval 5,560-5,620 ft., recovery was at an estimated rate of 200 bbl. a day of 31.9°-gravity crude, 0.9 per cent cut. A shut in pressure of 2,600 psi. was reported. Operator is coring ahead before setting pipe.

Wildcat to Be Drilled In Camarillo Hills

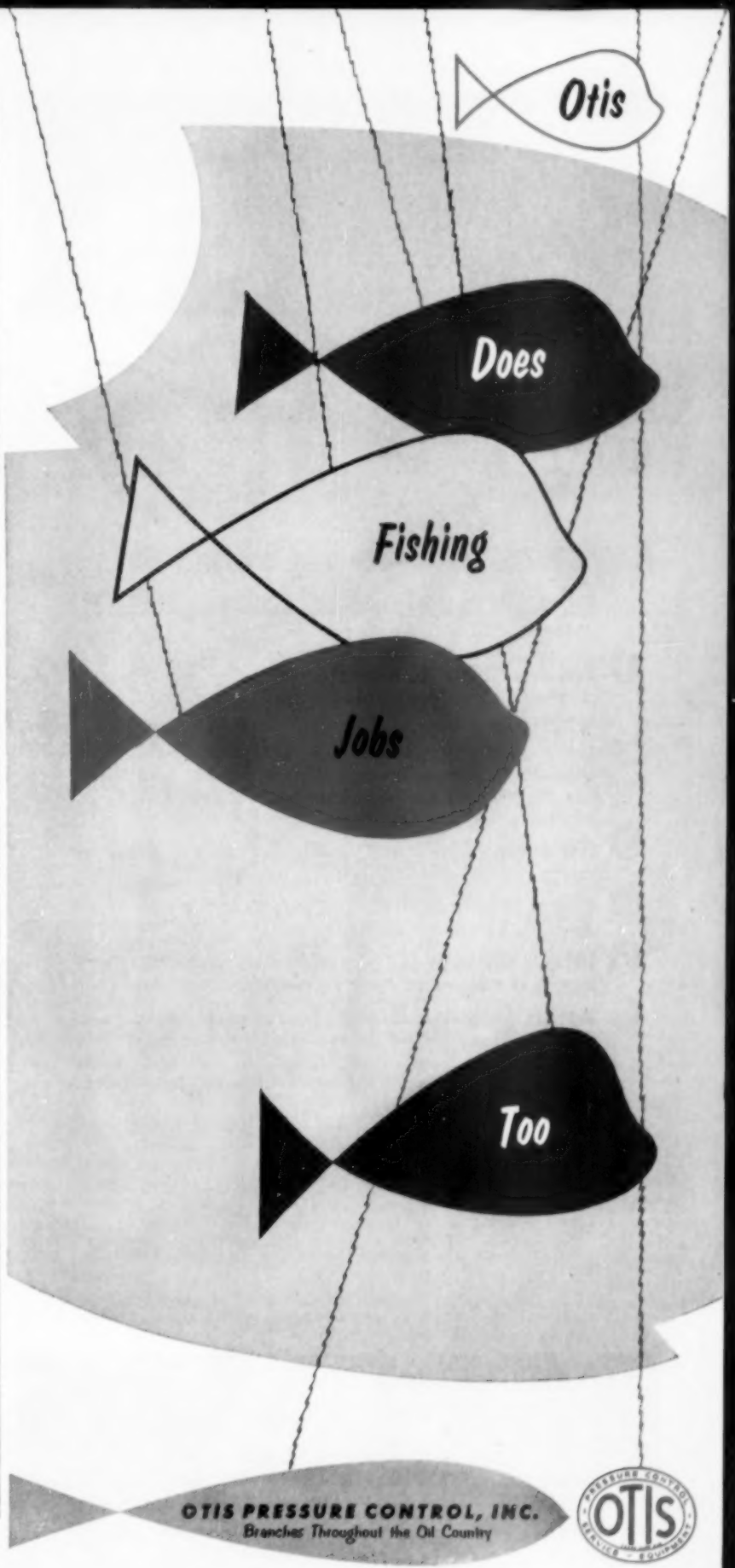
Union Oil Co. will drill a test in the Camarillo Hills area of Ventura County. Location for the wildcat, 1 Tassano, has been staked in 23-2n-21w, or about 4 miles northeast of oil production in Oxnard field. Union Oil has stepped up its exploratory work in Ventura County in the last few years with the result that production has been increased from 500 bbl. at the close of World War II to about 15,000 bbl. a day at the present time. Number of producing wells has been increased from 102 to 299.

Miocene Test Near Lompoc

Intex Oil Co. is preparing to drill a test to the Miocene about 8 miles southwest of Lompoc field in Santa Barbara County. Location for 1 Lagomarsino has been staked in 33-7n-35w. Operator has acquired a block of leases in the area aggregating 4,000 acres. The Miocene objective is expected at about 3,000 ft.

Set Pipe in Offshore Well

Monterey Oil Co. is reaming to set casing in its 3 Monterey-Texas-State, drilled on a man-made island in the Pacific 1½ miles from the coastal town of Seal Beach, Orange County. Previous unconfirmed reports that pipe had been set in this tight hole proved to be premature. Well was bottomed at



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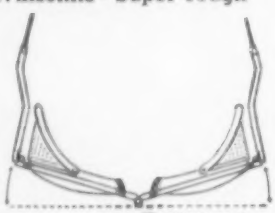

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10,162 ft., but scouts believe the pay, if found, will be several thousand feet short of that depth. Operator's plan originally was to drill to basement for a conclusive test, but drilling stopped short of that objective. This is a joint operation with Texas Co. on offshore acreage leased from the state.

ROCKY MOUNTAIN

WYOMING

Gage Reported At Carbon Sundance Strike

McElroy Ranch, Natural Gas & Oil Corp. and Bruce Anderson report a flow of gas at the rate of 8,000 M.c.f. per day at 3 Horne, NW NE NW 11-20n-79w, Sundance strike in South Big Medicine Bow field, Carbon County.

The well is producing from perforations at 5,805-15 ft. in the Sundance. The well also is giving up distillate with no gage reported.

Burke Ranch . . . Mohawk Petroleum Co. 1 Government, NW SW SW 8-37n-78w, Burke Ranch extension in Natrona County, flowed 405 bbl. of oil daily from open hole in the Dakota. The operator found about 24 ft. of saturated sand in the wildcat, which is just inside Burke Ranch Unit.

Washakie County . . . The California Co. is swabbing at 8 Neiber Dome, NW NW NE 30-45n-91w, Washakie County Tensleep discovery.

The operator recovered oil at 10,519-545 ft. The strike is about 5 miles southeast of Neiber field production. It is a significant discovery due to recent strikes along the Big Horn basin's southeast flank.

MONTANA

Ordovician Discovery Near At Fallon County Location

Shell Oil Co. has an apparent Ordovician discovery at 14-34 Unit, C SW SW 34-5n-61e, Fallon County.

The firm recovered 4,600 ft. of gassy, muddy oil on a 4-hour drill-stem test in the Red River at 8,289-8,379 ft. Recovery also included 100 ft. of 25 per cent oil-cut mud. The prospective discovery is about 2 miles northwest of Little Beaver-Ordovician field. The wildcat also has promising shows in the Madison at 6,828-58 ft.

New Pay Tested at Clark's Fork Well in Carbon County

J. Ray McDermott has tested a new pay at 1 Unit, SE SW NW 27-9s-22e, Clark's Fork Unit test in Carbon County.

Recovery was 1,650 ft. of 45°-gravity oil in 30 minutes on a drill-stem test of basal Frontier sands at 6,715-57 ft. Recovery included 30 ft. of oil and gas-cut mud.

COLORADO

Gas Flows on Test Of Archuleta Wildcat

Gas has been recovered at the rate of 762 M.c.f. per day on test at 2,518-62 and 2,590-2,640 ft. at Stanolind Oil & Gas Co. 1 Bixler

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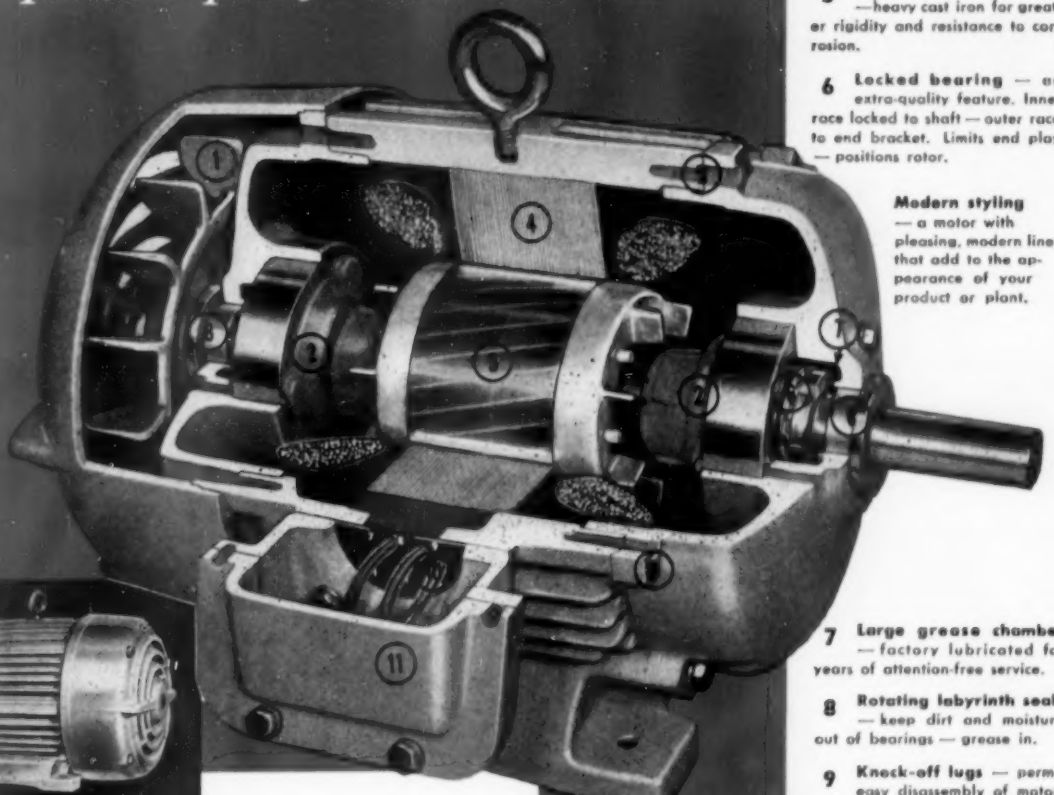


1 **Fan** — efficient, non-sparking fan. New aerodynamic design for more effective cooling.

2 **Inner bearing cartridges** — lock bearings to end bracket and form explosion-quenching seal along shaft.

3 **Indestructable cast-aluminum rotor**—dynamically balanced with fan for smooth, quiet operation.

4 **Stator** — prewound stator core utilizes Formvar wire insulated with a new Alkyd Asphalt Resin insulating varnish.

5 **End bracket and housing** —heavy cast iron for greater rigidity and resistance to corrosion.

6 **Locked bearing** — an extra-quality feature. Inner race locked to shaft — outer race to end bracket. Limits end play — positions rotor.

Modern styling — a motor with pleasing, modern lines that add to the appearance of your product or plant.

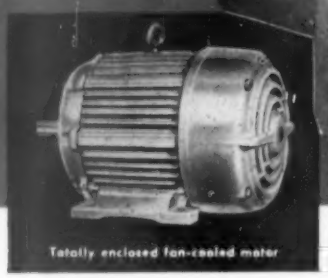
7 **Large grease chamber** — factory lubricated for years of attention-free service.

8 **Rotating labyrinth seals** — keep dirt and moisture out of bearings — grease in.

9 **Knock-off lugs** — permit easy disassembly of motor.

10 **Lead identification**—permanent, positive lead identification spacer in conduit box.

11 **New split conduit box** — rugged cast-iron conduit box diagonally split for easy connection.



Totally enclosed fan-cooled motor

Cutaway view of explosion-proof motor

This is the completely new L.A. totally enclosed fan-cooled and explosion-proof motor. Every feature in this new line is designed for easier installation, longer service life, less maintenance and attention. You get the full benefit of the new NEMA standards in a smaller, more functional, completely modern design.

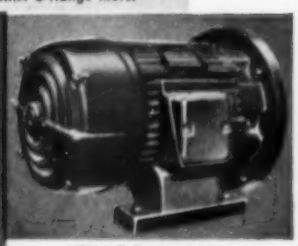
Your nearby Louis Allis Sales Engineer can show you all the reasons why these motors perform better and longer on your tough jobs — why they give you maximum resistance to corrosion wherever you need this extra protection. Call him today.

THE LOUIS ALLIS CO.
MILWAUKEE 7, WISCONSIN

LA-103

Vertical NEMA D-flange motor

NEMA C-flange motor

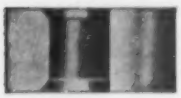


NEMA D-flange motor

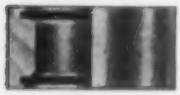
We specialize in SPECIAL MOTORS — *and* PROMPT DELIVERY, TOO

There's a Louis Allis special motor for your toughest application. Whatever electrical or mechanical modifications you need, check first with Louis Allis.

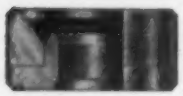
Ball and Seat ASSEMBLIES



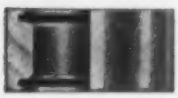
"Single Seal" Seat
A competitively priced stainless steel seat for routine pumping.



"Double Seal" Seat
For harder than usual pumping—double contact with the ball.



"O-Ring" Seat
Recommended particularly where ordinary or fracturing sand is causing seat failures. A 2-piece seat made of stainless steel.

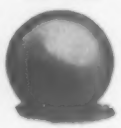


"Sheralloy" Seat
A cast alloy definitely proven resistant to corrosion. Also good for hard pumping.

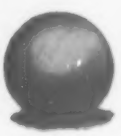
"Stainless Steel" Ball
For ordinary pumping where little trouble is encountered.

"Ceramic" Ball
Nearly as hard as a diamond. Non-corrosive and non-magnetic.

"Monel or Hastelloy D" Ball
Both are non-magnetic and quite resistant to corrosion but are softer than stainless steel balls. Monel is cheaper.



"Sheralloy" Ball
Excellent to combat corrosion and hard enough for deep pumping. Non-magnetic.



What is your trouble?

CORROSION?
Deep Pumping — Use a Baird "Sheralloy" seat with a "Ceramic" ball.
Shallow Pumping — Use a Baird "Stellite" seat with a "Monel or Hastelloy D" ball.

BALL PITTING?
Use a Baird "Double Seal Stainless" seat with a "Ceramic" ball.

FRACTURING or FLOATING SAND?
Use a Baird "O-Ring" seat with a Stainless ball.

BAIRD Products are available only through supply stores and pump shops.

BAIRD MFG. CO.
P. O. Box 380 TULSA, OKLA.

Gas Unit, W½ NE SW 14-32n-6w, Archuleta County wildcat.

Jackson County . . . Gas was recovered on test of the interval 7,964-93 ft. at 1 Government, SW NW NW 32-8n-78w, Jackson County. The wildcat is Monolith-Portland-Midwest's test. The well flowed at the rate of 500 M.c.f. per day after 6 minutes.

Adams-Washington Wildcats Get Good Testing Results

Ryan Oil Co.-Davis Oil Co. and Potter Drilling Co. 1 Doss, SE SE SW 8-2s-59w, west of Badger Creek field, was completed for a flow of 30 bbl. of oil hourly through ¾-in. choke in the "J" sand.

Southeast New Drilling Co. pumped 130 bbl. of oil in 10 hours at 1 Blomenkamp, C NE NE 17-3s-56w. Production is from the "J" sand. This new pool is called Big Beaver.

NEW MEXICO

SOUTHEASTERN NEW MEXICO

Delaware Basin Wildcat Is Gas-Distillate Discovery

Continental Oil Co. 2 Bell Lake Unit, located 1 mile north of the firm's original deep test which had to be junked at 12,616 ft. due to fire, was slated for completion as a lower Wolfcamp discovery.

Total depth on the second test was 12,657 ft. Drill-stem test from 12,617-12,657 ft., open 1½ hours, had water blanket at the surface in 10 minutes and gas in 14 minutes. Volume was measured at 10,000 M.f.g. Distillate yield on the test was 10 bbl. in 1 hour. Flowing pressure ranged from 4,500-6,375 psi. Recovery in the pipe was 500 ft. of water blanket and 500 ft. of distillate. Operators ran casing to 12,470 ft. for completion attempt.

Jake L. Hamon and Warren Petroleum Corp. had a second Devonian well in prospect at their 1 Wilhoit, 18-17s-38e, west offset to the same operators' 1 Federal-Davis. A drill-stem test from 12,144-12,182 ft. had gas in 1½ hours and flowing oil in 2 hours and 20 minutes. It cleaned into pits for 12 minutes, then tanked 38.6 bbl. of oil during the remaining 15 minutes of the test. Recovery in the pipe was oil with no formation water. Operators drilled ahead to 12,551 ft. to run casing.

KENTUCKY

EASTERN KENTUCKY

In eastern Morgan County, Buffalo Oil Co. has completed as a dry hole its wildcat 1-C Charles Hill. Well was drilled to total depth of 922 ft. in Berea sand which was topped at 869 ft. Weir sand, the normal productive zone for the area, was encountered

LEGAL

Sealed bids for Oil and Gas Mining Leases on restricted Allotted lands of the Fort Berthold Indian Reservation, North Dakota, will be received at the Office of the Superintendent of said reservation, New Town, North Dakota until 2:00 P. M., Central Standard Time on September 28, 1954, and will be opened immediately thereafter in the presence of such bidders as may attend. Total allotted land is 16,581.33 acres. All of this land is located in McKenzie county, State of North Dakota. For additional information write the superintendent of the Fort Berthold Agency, New Town, North Dakota, or call the Agency Land Office, phone 74340, New Town. Ralph M. Shane, Superintendent.

THE GREATEST IMPROVEMENT ...FOR CENTERING CASING WHILE CEMENTING SINCE 1925

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LATCH-ON CENTRALIZERS with the NEW
KON-KAVE BOW

B and W KON-KAVE BOW combines a curved cross-section, highest quality spring steel, drop forging, and the proper heat treatment to relieve all stresses created in forming and welding B and W KON-KAVE BOWS.

FIRST IN THE FIELD!

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- Most resistance to deformation . . .
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Well Completion Specialists

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Houston 12, Texas	Los Angeles 54, Calif.
Phone WE-6603	Phone ME-4-1106

from 770 to 801 ft. but carried only odor and stain.

LOUISIANA

SOUTH LOUISIANA

Amelia Extension Well Discovers New Pay Zone

M. L. Mayfield Co.'s third well in the Amelia area, 14 miles east of Morgan City, in southern Assumption Parish, got a good flow of gas and distillate with 3,000-psi. pressure in a drill-stem test of a new sand horizon at 13,500 ft. Bottom-hole pressure was 6,300 psi.

The indicated well, 2 Lutcher-Moore, is a mile east of the company's discovery well (1 Lutcher-Moore), completed last January as a gas-distillate producer in a deeper sand at 14,224-30 ft. The operator's second well, 1 Landry et al, completed in June in the latter sand, is 1 mile west of the discovery well.

Operators are drilling ahead at the new well, projected to 15,500 ft. Roads are being built to two new locations, one a mile east and the other 1 mile south of the indicated east-extension well.

New Offshore Discovery Opens Shallow Gas Sand

A new shallow gas-productive reservoir has been uncovered by Magnolia Petroleum Co. near its Eugene Island Block 45 field, in the Gulf of Mexico, off the coast of Iberia Parish.

The discovery well is 1-D State Lease 842, located in Block 50, adjoining Block 45 to the south. On tests through 15/64-in. choke, the well flowed at the rate of 1,729,000 cu. ft. per day with 1,370-psi. pressure. Pay is at 3,628-38 ft., to which the hole was plugged back after drilling to 12,862 ft.

Oil Production Opened In New Crab Lake Gas Area

Forest Oil Co. is completing its third test in the Crab Lake area, southeast of Grand Chenier gas field, in Cameron Parish. It opens a new pay zone, productive of oil. Previous production has been gas and condensate.

The new well, 3 Miller, flowed at the rate of 337 bbl. of 39.6°-gravity oil with 4,500,000 cu. ft. of gas per day through 12/64-in. choke. Production is from Miocene sand at 12,576-86 ft.

Location is southeast of the company's initial test, 1 Miller, which blew out while drilling at 13,330 ft. and later was junked and abandoned. The operator's second test, 2 Miller, 2,250 ft. west of the blow-out well, was completed last May as a gas-condensate producer in sand at 9,918-25 ft.

WILDCAT COMPLETIONS

SOUTHWEST TEXAS

District 1

Atascosa County: Alaska Steamship Co. and Texita Oil Co. 1-B Prassel, Solomon Simmonds Sur., A-767. Dry. TD 5,013 ft.

Thomas Brothers et al 1 Santos de Leon, Edward Estes Sur. 1188. Dry. TD 1,706 ft.

Frio County: M. L. Wise et al 1 Keller, Maria

TO COMBAT LOST CIRCULATION

Fibrous material blended with flat, spongy flakes . . . shown actual size.

HUNDREDS NOW GETTING
TOP RESULTS
AT LOW COST

Success-in-use, plus economy, has made Silvacel one of the industry's most widely used materials to combat lost circulation. Silvacel is a scientifically designed blend of specially prepared fibrous materials of controlled length, combined with flat, spongy flakes. This blend provides a wide range of particle sizes and shapes ideally suited for complete sealing of the most difficult fractured and vugular formations. Bridging is quick . . . forming a tough, fibrous mat which becomes imbedded with mud to speedily form a tight seal.

CHECK THESE FEATURES:

- Does the job quickly, at low cost.
- Comes in easy-to-handle, loosely packed 40-lb. bags.
- Pourable; mixes readily with mud—is easily "wet" by mud.
- Does not break down through circulation.
- Will not rot, deteriorate or sour in storage or in the hole.
- Is readily pumped through ordinary rotary drilling equipment and does not "rope" or "ball up."

SILVACEL available through most supply companies.
Write us for more information.

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SPECIAL PRODUCTS DIVISION • TACOMA 1, WASHINGTON

Jesusa Trevino Sur., A-633. IPP 186 BOPD, 33°, open hole 5,572-5,862 ft. TD 5,862 ft. (New field.)

McMullen County: C.M.U.R. Oil Co. 1 Martin, H. L. Williams Sur. 18. Dry. TD 670 ft.

Howeth & Mason 1 Brown, Section 54, Shumway Subd., Shiner Ranch, Herman Pressler Sur., A-1109. Dry. TD 1,396 ft.

Howeth & Mason 2 Brown, Section 36, Shumway Subd., Shiner Ranch, Herman Pressler Sur., A-1109. Dry. TD 1,402 ft.

District 4

Duval County: Quintana Petroleum Co. 1 Allen, Share 6, McNeill Partition of Las Anacuas Grant, A-627. Dry. TD 6,316 ft.

Joe M. Sowarby et al 1 Parr, La Huerta Grant, A-227. Dry. TD 6,150 ft.

Jim Wells County: H. R. Smith 1 Clara Driscoll, La Jaboncillas Grant, A-378. Dry. TD 6,322 ft.

Southwest Workover et al 1 Perkins, La Vaca Grant. IPP 135.35 BOPD, 41°, perforations 4,597-4,612 ft. TD 5,565 ft. (New field—Perkins.)

Gust Tsesmelis 1 Canales, La Tinaja de Lara Grant, A-36. Dry. TD 7,502 ft.

Gust Tsemelis 1 Kalinec, Lavacca Grant. Dry. TD 5,600 ft.

Nueces County: Atlantic Refining Co. 1 Fischer, Section 27, Laureles Farm Tracts, Ramon de Ynojosa Grant, A-411. (Southeast London area). Dry. TD 5,002 ft.

San Patricio County: Arnold H. Bruner 1 John Hancock, T. Williamson Sur., A-151. IP 68 BOPD, ¼-in., 32°, perforations 5,579-81 ft. TD 7,018 ft. (New field—West Taft.)

J. P. Petkas, Harrell & Southworth 1 Terry-Miller, Malcolm McAuley Sur. Dry. TD 7,000 ft.

Starr County: Hawn Brothers and Cyrus Heard 1 Fannie Heard heirs, Block 20, Share 2, Subdivision B of G. O. Newman Subd., El Benadito Grant. Dry. TD 7,750 ft.

Webb County: Tom Gouger and Tom Steward 1 Benavides, Block 3, Survey 692. Dry. TD 2,547 ft.

O. W. Killam 1 Walker, Survey 1011. Dry. TD 3,259 ft.

TEXAS GULF COAST

District 2

Bee County: General Well Service, Inc., 1 Brown, Josa Maria Uranga Sur., A-68 (Normanna area). Dry. TD 3,700 ft.

Calhoun County: Quintana Petroleum Corp. 1 Walker, Maximo Campos Sur., A-4. Dry. TD 4,876 ft.

Goliad County: Joseph S. Morris 1 Key, GWT&P Sur., A-320. Dry. TD 8,530 ft.

Jackson County: George S. Hammonds 3 Robinson, Jessie Wilson Sur., A-86. Dry. TD 4,708 ft.

Karnes County: Producers Corp. of Nevada and Cosden Petroleum Co. 1 Cochran, William Hunter Sur., A-137. Dry. TD 6,276 ft.

Lavaca County: Seaboard Oil Co. et al 1 Beran, Thomas D. Fisher Sur., A-186. Dry. TD 8,102 ft.

Live Oak County: George W. Graham and Emory M. Spencer 1 Sellers, John McMullen Sur., A-30. Dry. TD 5,017 ft.

Refugio County: Louis H. Haring, Jr., et al 1 James F. Welder heirs, James T. McGrew Sur. Dry. TD 6,515 ft.

Victoria County: Kilroy Oil Co. of Texas 1 McKan et al, James Wilson Sur., A-549. Dry. TD 6,487 ft.

H. G. Spiller and W. P. Holloway 2 Airport, Manuel Zepeda Sur., A-128. Dry. TD 2,670 ft.

District 3

Chambers County: Sparta Oil Co. et al 2 State Lease M-34858, Sec. 52, Trinity-Galveston Bay. Dry. TD 9,344 ft.

Colorado County: Christie, Mitchell & Mitchell 2 Bass, George J. Duncan Sur., A-174. IP 7,250 M.c.f. daily, open-flow potential, gas-condensate ratio 49,000 cu. ft. per barrel, 52°, perforations 8,625-54 ft., 8,676-8,700 ft., and 8,702-12 ft. TD 10,304 ft. (New pay in Garwood field.)

Hardin County: Meredith & Co. 1 Little, L. de Lesslie Sur., A-35. Dry. TD 8,812 ft.

Harris County. C. J. Brown 1 Casey, W. Britton Sur., A-118. Dry. TD 6,515 ft.

Liberty County: The Texas Co. 2-C Wirt Davis estate, Manuel de los Santos Coy Sur., A-16 (Davis Hill). Dry. TD 8,992 ft.

Montgomery County: W. Stewart Boyle et al

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for performance . . .
for meeting schedules . . .
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Complete Inland Waterways bulk service—Petroleum and Chemical Products—also common carrier New Orleans West.
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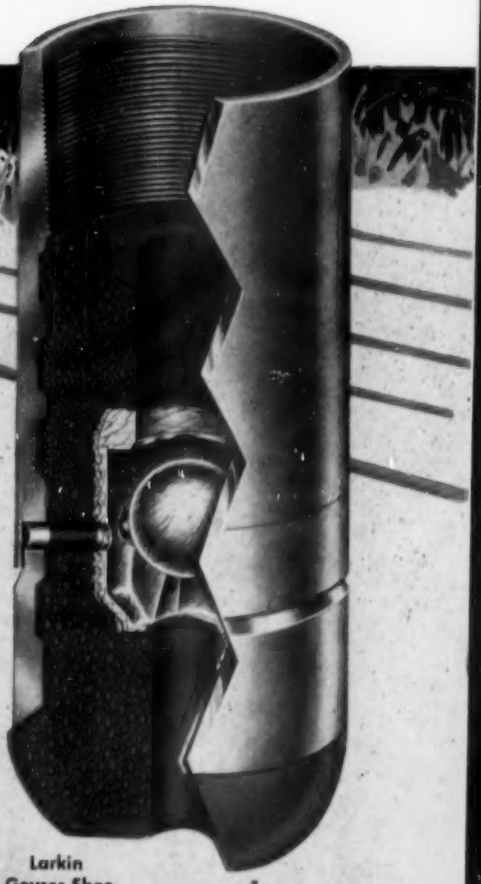

Larkin Geyser Shoe

The Larkin Geyser Shoe contains an exceedingly strong, positive sealing, full opening back-pressure valve which will safely handle casing strings of any size or length. The proportioned discharge of the slurry through the peripheral ports evenly distributes the cement around the casing, thus providing the most favorable start toward a successful cement job. The internal construction of Larkin Floating Equipment is of a special formula Bakelite set in carefully cured concrete. It is easy to drill and circulate from the well.

The satisfactory performance of Larkin equipment is demonstrated in a predominant number of wells—each day—in oil fields everywhere.

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Larkin M&F Float Collar

Larkin Geyser Guide Shoe

Larkin Regular Guide Shoe

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On hundreds of daily jobs, the Leland "Packaged Unit" Oil Field Truck Body confirms this confidence with workhorse performance beyond the call of duty. The "Packaged Unit" is the most versatile truck body in use today. Each feature is designed for maximum efficiency . . . maximum safety. The "Packaged Unit" is supplied with gin poles . . . a heavy duty winch can be mounted at your option.

Leland
EQUIPMENT COMPANY
Oklahoma City • TULSA • Longview, Texas

1-A First National Bank of Galveston, William White Sur., A-592. Dry. TD 6,008 ft.

Humble Oil & Refining Co. 1 Conroe Townsite Gas Unit 1, John Bricker Sur., A-71. IP 8,900 M.c.f. daily, open-flow potential, gas-liquid ratio 199,000 cu. ft. per barrel, 48.6°, Cockfield 4,899-15 ft. (perforations). TD 6,500 ft. (New pay in Conroe Townsite field.)

Panuco Oil Leases, Inc., and M. T. Halbouty 1 Brown et al, Lot 6, Randerson Subd., William Hillhouse Sur., A-260. Dry. TD 9,587 ft.

Wharton County: Caribbean Oil Corp. 1 Stovall, M&C Sur. 31, A-291. IP 92.5 BOPD, 8/64-in., 27.8°, perforations 5,454-56 ft. TD 5,540 ft. (New field—Lou Hill suggested name.)

EAST TEXAS

Bowie County: Sohio Petroleum Co. 1 Boone, S. Mayfield Sur. Dry. TD 4,323 ft.

Cass County: B. F. Weekley & Associates 1 Beaver, Samuel Harrison Sur., A-525. Dry. TD 5,016 ft.

Cherokee County: British American Oil Producing Co. 1 Holcomb, Z. Gibbs Sur., A-21. Dry. TD 5,191 ft. Elev. 324 ft., Woodbine 5,115 ft.

D. D. Feldman Oil & Gas Co. 1 Whiteman & Decker, I&GN Sur., A-420. Dry. TD 5,478 ft.

Watburn Oil Co. 1 Durrett, T. C. Arrington Sur., A-66. Dry. TD 5,270 ft.

Gregg County: General American Oil Co. 1 Flanagan, Haden Edwards Sur. Dry TD 7,650 ft.

Harrison County: Midstates Oil Corp. 1 Taylor, Wilson Ewing Sur., A-5, 3½ mi. SW Leigh. IP 173 BOPD, 14/64-in., 35°, GOR 506 cu. ft., TP 325 psi., Pettit perforations 6,222-27 ft. TD 6,600 ft. Discovery of Locust Grove pool.

Kaufman County: Group Oil Co. 1 Shelby Godwin, Thomas Berry Sur., A-25. Dry. TD 4,071 ft.

Navarro County: Four W Oil Co. 1 Menger, D. D. Anderson Sur., A-27. Dry. TD 3,545 ft.

TEXAS PANHANDLE

Roberts County: Marsh et al 1 Martin, C-83, G&M. Dry. TD 10,783 ft.

Wheeler County: Stanolind Oil & Gas Co. 1 Johnson, A-9-25, H&GN. Dry. TD 5,200 ft. Geological wildcat.

WEST CENTRAL TEXAS

Callahan County: Ike Drilling Co. 1 Smith, 9-5-SPRR. Dry. TD 834 ft.

Mid-Continent Petroleum Corp. 1-B Cutbirth, A. Smith Sur. 747. Dry. TD 2,097 ft.

Ray Oil Co. 1 Thompson, Sec. 1, SPRR Sur. Dry. TD 1,978 ft.

Ted Weiner 1 Windham, 161-2-GH&H. Dry. TD 3,420 ft.

Coleman County: H. A. Birdwell & Son Drilling Co. 1-A Simpson, Samuel Crooks Sur. 736, 1 mi. S Coleman. IP 84 BOPD, 20/64-in., 41°, GOR 480 cu. ft., TP 140 psi., Gardner sand 2,433 ft. TD 2,451 ft. New pay discovery.

Brannon & Murray 1 McCord, G. L. Roberts Sur. 12. Dry. TD 3,664 ft.

W. W. Harvey 1 McCord, Sec. 20, McCord & Linsey Sur. Dry. TD 4,054 ft.

Eastland County: C. F. Fourgurean 1 Ables, Blk. 17, G. W. McGraw Sur. Dry. TD 1,200 ft.

G. E. Fryar 1 Flippen, Blk. 7, John McGloin Sur. 798. Dry. TD 1,610 ft.

Haskell County: Ted A. Norwood 1 Farrel, 16-1-H&TC. Dry. TD 3,666 ft.

Jones County: J. C. Hunter 1-C Minter, Rob-

reduced to $16.32

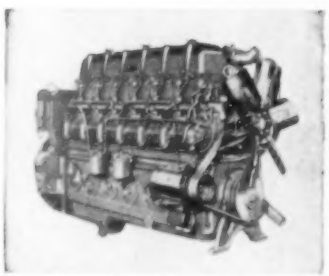
We can't sell you just one. We will sell you 30 to 255 "horses" at the lowest price you can buy diesel power: $16.32 a horsepower for the 6-cylinder model.

If you know diesel, you know there is nothing else like it. A diesel will take on any job you might give to a gasoline engine — and do it for one-third the cost. Not only that, it is simpler to maintain.

Buyers no longer ask *whether* diesel but *which* diesel. Which will deliver the most horsepower for the money? The most horsepower per pound of weight? Which is the easiest to service?

All three questions have one answer: *the P&H Diesel.*

P&H Diesel Engine Division, Harnischfeger Corporation, Crystal Lake, Ill.



Horsepowers, 30 to 255. Two-cycle, 2, 3, 4, 6-cylinder models. Speeds to 1800 rpm. Stationary, mobile, marine. Diesel-generator sets

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lowest price per horsepower . . .
lowest weight per horsepower

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Hollaway is Lee C. Moore Southwest Division Manager. His time is devoted to consulting with users of drilling equipment in order to help them get better and more economical drilling structures.

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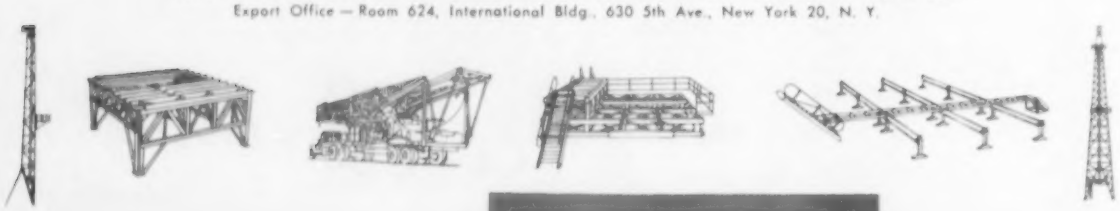

ert Smith Sur. 192. Dry. TD 5,470 ft.

G. E. Kadane & Sons 5-A Harrell, Sec. 7, OAL Sur., 7 mi. SW Avoca. IP 90 BOPD, 21/64-in., 40°, TP 50 psi., GOR 240 cu. ft., limestone pay 2,189 ft. TD 2,218 ft.

Stroube-Central Oil Co. 1 Sam Swann, Gabriel Zumalt Sur. 279, 8 mi. N Trent. IP 241 BOPD, 16/64-in., 43°, GOR 900 cu. ft., TP 250 psi., Palo Pinto reef perforated 4,699-4,703 ft. TD 4,758 ft.

Palo Pinto County: W. K. Gordon Jr. 3 Noland, 86-3-T&P. Dry. TD 3,609 ft.

Shackelford County: Farmer & Creswell 1 English, Sec. 26, University Lands Sur. Dry. TD 4,013 ft.

Hudspeth & Scaling 1 Shelton, Sec. 592, TE&L Sur. Dry. TD 731 ft.

West Central Drilling Co. 1 J. H. Nail estate, Sec. 102, ETRR Sur. Dry. TD 1,500 ft.

Stephens County: Leatherwood Drilling Co. 1 Allen, 10-2-SPRR. Dry. TD 4,643 ft.

Throckmorton County: Hale Brothers 1 Davis-Cooper, H. Hapgood Sur., A-207, 8½ mi. W Spring Creek. IPP 48½ BOPD, 38°, GOR 156 cu. ft., pay Strawn 3,762-83 ft. TD 3,958 ft.

Sojourner Drilling Co. 1-A Hendrick, Sec. 13, Brooks & Burleson Sur., Blk. M-5. Dry. TD 1,470 ft.

NORTH TEXAS

Archer County: Burt Oil Co. 2 Barry, Sec. 8, A-320, Andrew Nunley Sur., extension. IP 95 BOPD, 24/64-in., 41°, GOR 180 cu. ft., TP 20 psi., pay 2,974 ft. TD 3,000 ft.

H. M. Kelleher 1 Harmel, TE&L Sur. 2491. Dry. TD 1,485 ft.

P-M Drilling Co. 1-A Petrex, Blk. 112, ATNCL Subd. Dry. TD 1,488 ft.

Baylor County: Carl T. Anderson 1 Sayptak, T&NO Sur. 202, A-1309. Dry. TD 2,030 ft.

Archer Drilling & Production Co. 1-G Mills, Blk. 2427 TE&L Sur. Dry. TD 1,410 ft.

Archer Drilling 2-G Mills, Blk. 2427, TE&L Sur., A-466. Dry. TD 1,433 ft.

Archer Drilling 7-E Mills, TE&L Sur. 2414. Dry. TD 1,432 ft.

R. W. Darden 1-A Harmel, TE&L Sur. 2452. Dry. TD 1,550 ft.

Clay County: L. T. Burns 2-A Olsen, Blk. 81, Wood CSL, A-705. Dry. TD 4,164 ft.

L. T. Burns 1 Lindemann, Lot 28, Clark & Plumb, 4 miles NE Windthorst. IP 114 BOPD, 12/64-in., 44°, GOR 400 cu. ft., TP 410 psi., pay 5,535 ft., TD 5,549 ft.

Cooke County: C. C. Cannon 1 Cannon heirs, T. Hutchinson Sur., A-492. IP 53 BOPD, ¼-in., 41°, GOR 196 cu. ft., TP psi., pay 1,908 ft. TD 1,916 ft.

Kay Kimbell 1 Boaz, G. W. Boaz Sur., A-1366. Dry. TD 5,246 ft.

Grayson County: L. O. McMillan 1 Foster, T. Toby Sur., A-1246, 1½ miles SW Sandusky field. IP 244 BOPD, 12/64-in., 40°, GOR 450 cu. ft., TP 375 psi., Strawn 6,393-6,435 ft., perforated 6,406-6,412 ft. TD 7,400 ft.

Seitz, Comegys & Seitz 1 Graham, James Garland Sur., A-441. Dry. TD 4,315 ft.

Jack County: Walter L. Plemons Production Co. 1 Rhodes, C. J. Clark Sur., 1½ miles SW Steed field. IP 108.5 BOPD, ¼-in., 42°, pay 2,884-94 ft. TD 3,000 ft. Oil well reworked.

Wise County: Christie, Mitchell & Mitchell 1 Caswell, 2-6-Cooke CSO, A-156, 2 miles SW Alvord. IP 255 BOPD, ¼-in., 40°, GOR 786 cu. ft., TP 370 psi., Atoka conglomerate 5,666 ft. TD 5,937 ft.

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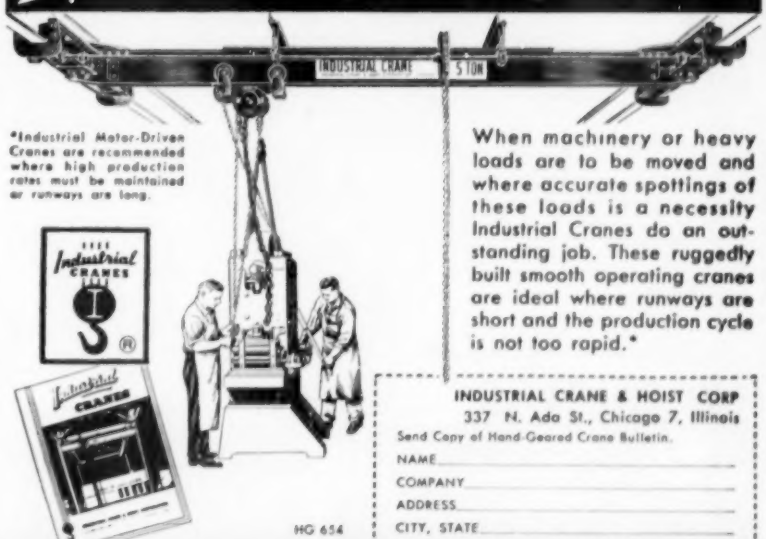

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Rio Arriba County: Phillips 1-C, SW NE NE 20-27n-3w. Dry. TD 6,207 ft. Point Lookout, Temp. abd.

Phillips 1 Indian "D," NE SW SW 21-29n-3w. Temp. susp. TD 6,075 ft.

Phillips 6 San Juan Unit 30-4, SW NE SW 33-31n-4w. Temp. susp. TD 6,040 ft. Point Lookout.

WEST TEXAS

Andrews County: Vests, Dorbandt & Ross 1-B McQuatters, 20-A34-PSL, 2 mi. NE Andrews. IP 361 BOPD, 16/64-in., 34°, GOR 442 cu. ft., TP 150 psi., pay 4,175-91 ft. TD 4,221 ft.

Crockett County: A. C. Bruce Jr. and T. J. Devine 1 Kelly, 3-GG-C. Marshall Sur. Dry. TD 2,012 ft.

Fullerton Oil Co. 1 Shannon, 6-FF-J. H. Edwards Sur. TD 8,079 ft. Elev. 2,646 ft., Ellenburger 7,760 ft.

Culberson County: Grisham-Hunter Corp. 1 Grisham-State, 19-54-PSL. Dry. TD 5,-017 ft. Bone Springs 4,970 ft.

Dawson County: Seaboard Oil Co. 1 Vaughn, 39-34-T5N-T&P, ½ mi. E Midway. IP 383.5 BOPD, 16/64-in., 40°, GOR 433 cu. ft., TP 450 psi., Spraberry perforations 8,195-8,227 ft. TD 8,285 ft. Designated Spraberry-Deep, West.

Gaines County: Atlantic Refining Co. 1 Ashenhurst, 132-G-WTRR. Dry. TD 11,240 ft. Elev. 3,268 ft., Wolfcamp 9,930 ft., Strawn 1,170 ft.

Lawton Oil Corp. 1-A Whitaker, 19-C30-PSL. Dry. TD 12,374 ft. Elev. 3,130 ft., Strawn 11,400 ft., Bend 11,696 ft., Mississippian 11,806 ft.

Garza County: Edwin L. Cox 1 Chaffin, Sec. 1255, TTRR Sur. IPP 112 BOPD, 37°, pay 3,704-08 ft. TD 3,830 ft.

Sam G. Dunn 2 McCrary, 61-5-GH&H, 10 mi. E Post. IPP 63.8 BOPD, 37°, pay 2,764 ft. TD 2,830 ft.

Howard County: Texas Pacific Coal & Oil Co. 1 Hyden, 47-32-T2N-T&P. IP 195 BOPD, 24/64-in., TP 200 psi., GOR 949 cu. ft., 43°, pay 9,905 ft. TD 10,055 ft.

Lamb County: The Texas Co. 1 Texas-Seaboard-Kirk, 6-1-R. M. Thompson Sur. IPP 175 BOPD, 22°, pay 6,414 ft. TD 6,494 ft.

Martin County: Stanolind Oil & Gas Co. 1 Brown, 15-34-T&P. IPP 65 BOPD, 38°, pay 8,282 ft. TD 8,430 ft.

Sutton County: Ada Oil Co. 1 Field, 48-B-HE&WT. Dry. TD 7,150 ft.

Tom Green County: R. J. Caraway 1 Parson, 76-11-SPRR. Dry. TD 6,505 ft.

L. E. Scherck 1-A Johnson, 13-25-H&TC. Dry. TD 6,010 ft. Ellenburger 5,760 ft. Stanolind 1-I. Johnson, 40-25-H&TC. Dry. TD 5,775 ft. Elev. 2,260 ft., Ellenburger 5,641 ft.

Upton County: Gulf Oil Corp. 1-ER State, 26-4-University Lands. Dry. TD 11,530 ft., Elev. 2,881 ft., Devonian 10,100 ft., Ellenburger 11,289 ft.

WEST TEXAS BORDER COUNTIES

Fisher County: Harvey Oil Co. 1-A Brown, Lot 12, Bastrop CSL Sur. 322. Dry. TD 6,415 ft. Elev. 1,874 ft., Ellenburger 6,104 ft., Cambrian 6,404 ft.

Runnels County: Walter Duncan 1 Bloxem, Sec. 528, J. Brown Sur., 1½ mi. SE Wingate. IPP 51 BOPD, 42°, GOR 538 cu. ft. Pay 2,448 ft. TD 2,452 ft.

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Garrett Production Co. 1 Brookshire, Sec. 41, J. H. Gibson Sur. Dry. TD 2,235 ft.
Thos. D. Humphrey & Sons 1 Cox, Sec. 41, J. H. Gibson Sur. Dry. TD 2,390 ft.
Stonewall County: Rhodes Drilling Co. 1 Bristow, Sec. 2, BBB&C Sur., 7 mi. NW Rule. IP 310 BOPD, ½-in., pay 5,812 ft. TD 5,829 ft.

MICHIGAN

Clare County: William B. Stewart & Basin Oil Co. 1 Bicknell, SW SE NW 6-18n-5w. Dry. TD 3,997 ft. in Dundee.
Kalamazoo County: Ford Oil Co. 1 Day, SW SW SW 25-3s-12w. Dry. TD 1,287 ft. in Traverse lime.
Monroe County: The Dow Chemical Co. 1 Grassley, SE SE NW 7-5s-7e. Dry. TD 3,325 ft. in St. Peter.
Ottawa County: Tri-County Development Co. 1 Host, SE NW NE 32-8n-13w. IPP 6 BOPD, Berea 1,168 ft., pay 1,170-75 ft., TD 1,175 ft. (New pool.)

OHIO

Coshocton County: John Morrow et al 1 Leslie Porteus, Sec. 9, Franklin Twp. Dry. TD 4,125 ft. in Clinton.
Perry County: Roy B. Weed et al 1 Cambria Mining Co., Sec. 3, Bearfield Twp. Dry. TD 3,809 ft. in Clinton.

WEST VIRGINIA

Mercer County, Beaver district: United Fuel Gas Co. 1-8010 Edward Combs, elevation 2,756 ft. Dry. Weir sand, TD 3,266 ft.

SOUTH LOUISIANA

Acadia Parish: Olin Oil & Gas Corp. 1 Goss et al unit, 22-7s-1e. Dry. TD 9,497 ft.
Forest Oil Corp. 1 Pousson, 19-9s-1w. IP 8,200 M.c.f. daily and 27 BCPD, 14/64-in., 47°, perforations 11,788-98 ft. and 11,801-11 ft. TD 11,843 ft. (New pay in Pine Bluff field.)
Cameron Parish: Union Oil Co. of California 1 Mermentau, 20-14s-5w (Little Chenier area). Dry. TD 11,853 ft.
Jefferson Parish: Richardson & Bass 1-B Cal-Nat. Unit, 16-18s-23e. IP 205 BOPD, 8/64-in., 31.9°, perforations 10,397-407 ft. TD 12,305 ft. (New pay in Little Lake north extension area.)
Jefferson Davis Parish: Austral Oil & Exploration Co. and La Gloria Oil & Gas Co. 1 Verret, 12-10s-6w. Dry. TD 10,700 ft.
Rapides Parish: Harvey Schmidt 1 Ervine et al, 25-3n-4w. Dry. TD 5,015 ft.
West Baton Rouge Parish: Natural Gas & Oil Co. 1 Westoner, 84-7s-12e (Lobdell area). Dry. TD 9,506 ft.

NORTH LOUISIANA

Catahoula Parish: Hunt Oil Co. H-101 Louisiana Delta Hardwood Lumber Co., Inc., C NE NW 34-6n-5e. Dry. TD 6,015 ft.
Concordia Parish: Norton Oil Co., Inc. 1 Miss. Valley Hardwood, 4-6n-8e. Dry. TD 6,606 ft.
Tensas Parish: Petersen Drilling Co. 1 Burns, 26-10n-10e. Dry. TD 5,706 ft.
Webster Parish: Justin M. Rukas 1 Waugh, 17-19n-10w. Dry. TD 7,362 ft.

OKLAHOMA

Carter County: British-American Oil Producing Co. 1 Smith "D," SW SW SW 1-4s-3e. Dry. TD 8,327 ft.
Coal County: Pasotex 1 Underhill, C SE SW 26-1n-11e. Dry. TD 15,675 ft.
Comanche County: Flynn Testerman 1-A Biles, SW SE SE SE 32-2n-11w. Dry. TD 695 ft.
Cotton County: Shelby York 1 Stickoff, SE NE SE 25-1s-12w. Dry. TD 2,419 ft.
Garvin County: F. L. Chapman 1 Hanks, NW SW NW 25-3n-3e. IPP 1 BOPD, sand 1,452-80 ft., 33°. TD 1,523 ft. (Oil well.)
Grant County: Portable Drilling Co. 1 Schmitz, SE SE SW 13-26n-3w. Dry. TD 4,915 ft.
Harper County: Ohio Oil Co.-The Texas Co. 1 Yauk, C NW NW 27-28n-21w. Dry. TD 7,735 ft. Arbuckle 7,630 ft.
Jefferson County: Roy M. Johnson 2 Faulkner, SW NE NW 11-4s-4w. Dry. TD 1,350 ft.
Kay County: H. Waggoner & Co. 1 Scott, SE SE SE 30-29n-2e. Dry. TD 3,991 ft.
1-A Lewis, NE NE NE 27-27n-3e. IPP 16 BOPD, Hoover sand 1,576-86 ft., 40°. TD 1,586 ft. (New pay in South Mervine pool.)
Coon Construction Co. 2 Christina, E½ NE NW 11-26n-4e. IPP 7½ BOPD, Prue sand 2,960-73 ft., 30°. TD 3,034 ft. (Oil discovery.)
Gulf Oil Corp. 1 Cline estate, NE NW NW 3-27n-2e. Dry. TD 3,695 ft.
Lincoln County: Davidor & Davidor 1 Harris, NE NE SW 15-16n-2e. Dry. TD 4,692 ft.
Texas-Pacific Coal & Oil Co. 1 Bilby, SW SE SE 17-16n-4e. Dry. TD 4,754 ft.
Logan County: Zephyr Drilling Co. 1 Smith, NW NW NW 23-15n-1e. IPF 150 BOPD, Skinner sand, 4,899-4,905 ft., 41°, 8/64-in. TD 4,905 ft. (Oil discovery.)
Murray County: W. L. Clingman 1 Coyle, E½ W½ NW 16-1n-3e. Dry. TD 938 ft.
Noble County: D. D. Feldman 1 Christman, SW SE NW 18-21n-2w. Dry. TD 5,553 ft.
McLean-McBride 1 Schaetzel, SW SW NW 36-21n-2w. Dry. TD 2,403 ft.

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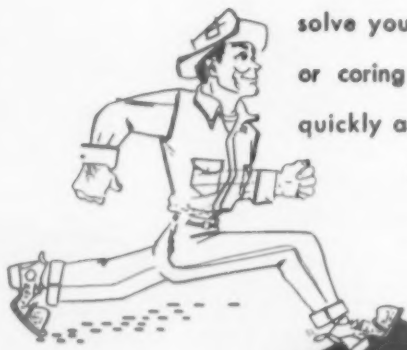

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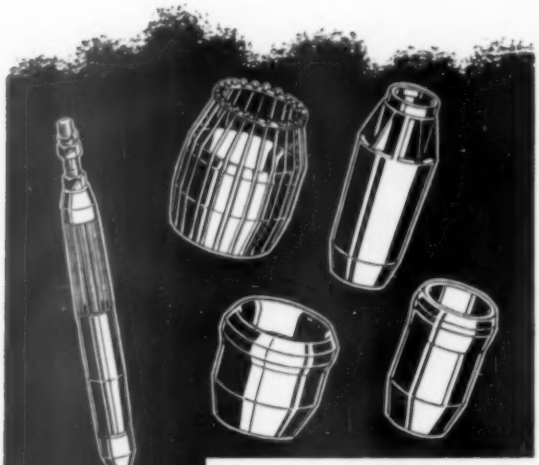

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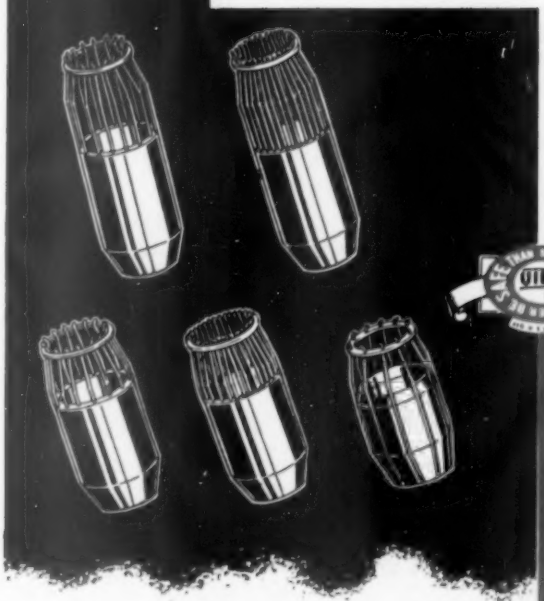

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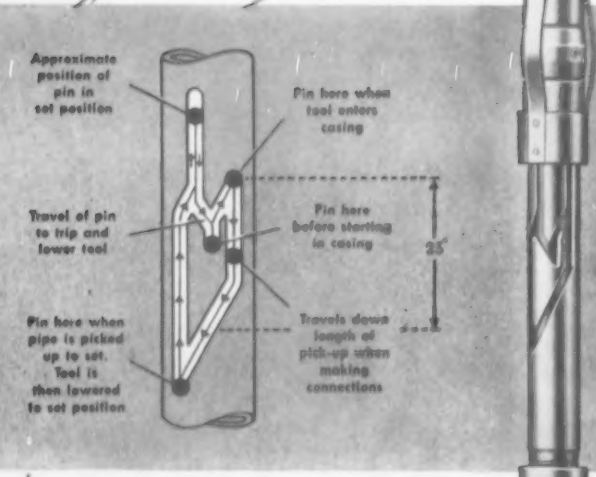
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Oklahoma County: Dillon Oil Corp. 1 Concannon, NW NW 24-11n-1w. Dry. TD 6,150 ft.

Payne County: W. F. Garmon et al 1 Katscher, NE NE NW 13-18n-1w. Dry. TD 5,500 ft.

Stephens County: Seaboard Oil Co. 1 Grooms, NW NW SW 16-1s-6w. Dry. TD 4,627 ft.

KANSAS

Barber County: Rupp-Ferguson 1 Powell, SW SW SW 36-33s-11w. Dry. TD 4,685 ft.

1 Koontz, NW NW NE 11-34s-11w. Dry. TD 5,214 ft.

Imperial Drilling Co. 1 Blunk, NE SW SW 5-34s-13w. IP 2,530 M.c.f. of gas per day, Mississippian 4,876-82 ft. TD 5,515 ft. (Gas discovery.)

Graham County: Lohmann-Johnson 1 Pettett, SE SE NW 25-9s-24w. Dry. TD 4,495 ft.

Imperial Drilling Co. 1 Moore, NW NW SW 27-9s-24w. Dry. TD 4,587 ft.

McPherson County: Seneca Oil Co. 1 Johnson, NW NW SW 2-17s-1w. Dry. TD 2,755 ft.

Durbin Bond et al 1 Durland, SW SW NE 5-19s-5w. Dry. TD 3,921 ft.

Norton County: Jones, Shelburne & Farmer 1 Keen, NE NE SE 18-1s-22w. Dry. TD 3,710 ft.

Pawnee County: GMR 1 Higgins A, NE NE SW 19-22s-18w. Dry. TD 4,698 ft.

Pratt County: Musgrove Petroleum Co. 1 Thompson, NE NE NW 27-28s-14w. Dry. TD 4,681 ft.

Lario-Cities Service Oil Co. 1 Schrepel, NW NW SE 16-29s-14w. Dry. TD 4,715 ft.

Rice County: Virginia Drilling Co. 1 Froning, SE NE SW 15-18s-8w. Dry. TD 3,424 ft.

Seward County: Columbian Fuel Corp. et al 1 Atwell, NW NW SE 9-33s-31w. Dry. TD 6,050 ft. St. Louis 6,008 ft. Geological wildcat.

Sedgwick County: J. P. Gaty 1 Dotts, NE NW NE 33-27s-2e. Dry. TD 3,340 ft.

Stafford County: Natural Oil & Gas-Amerada Petroleum Corp. 1 Metz, NW NW SE 32-22s-13w. Dry. TD 3,901 ft.

NEBRASKA

Dawes County: Amerada Petroleum Corp. 1 Anderson, NE SE NW 26-31n-47w. Dry. TD 1,662 ft. Dakota.

Kimball County: Sam Joseph 1 Houtby, SE SE SE 5-14n-54w. IPP 20 BOPH, "J" sand discovery, new field. TD 6,010 ft.

Natural Gas & Oil Corp. 1 Smith, SE SE SE 1-14n-55w. Dry. TD 6,215 ft.

Williamson, Nixon and United Drilling Co. 1 Sweringen, SE SE NE 15-14n-55w. IPP 450 BOPD, "J" sand discovery, new field. TD 6,330 ft.

SOUTH DAKOTA

Potter County: Independent Drilling Co. 1 Hinckley, NW NW 7-120n-75w. Dry. TD 3,030 ft. Devonian.

Stanley County: Shamrock Oil & Gas Co. 1 Barrick, SE SE 29-8n-27e. Dry. TD 3,924 ft. Pre-Cambrian.

NORTH DAKOTA

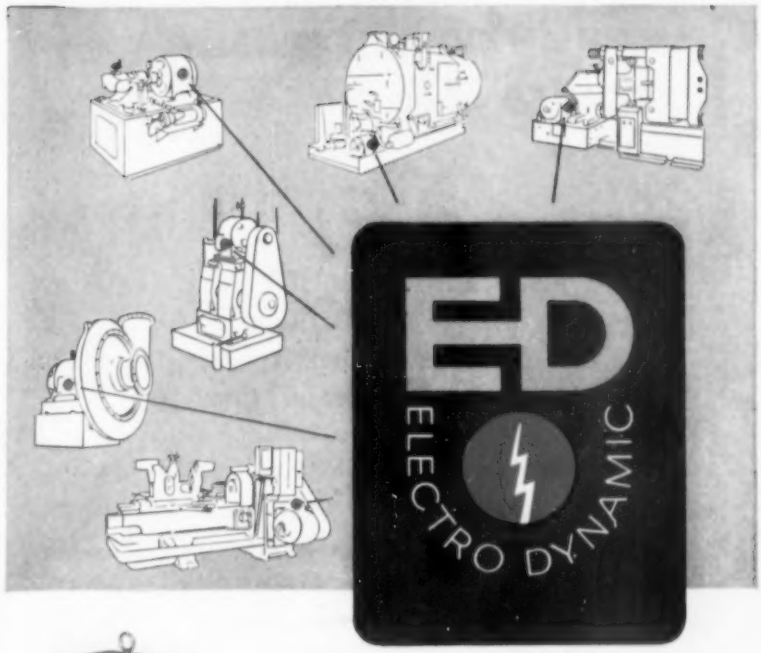
Benson County: Shell Oil Co. 1 Hofstrand, NE NE 2-154n-69w. Dry. TD 3,030 ft. Ireton.

Billings County: Stanolind 1 Northwestern Improvement, SE SE 17-143n-100w. Dry. TD 13,888 ft.

McIntosh County: Calvert Exploration 1 Wishek, SW NW 33-130n-69w. Dry. TD 2,915 ft. Red River.

1-X Wishek, SW NW 33-130n-69w. Dry. TD 2,973 ft. Red River.

Wells County: Caroline Hunt Trust Estate 1



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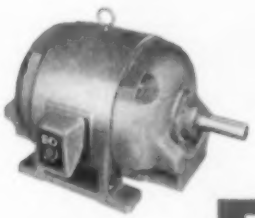

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Thormadsgaard, NE NE 31-147n-71w. Dry. TD 5,252 ft. Winnipeg.

CALIFORNIA

Fresno County: Sam B. Herndon, Operator 1 Murietta, 22-14s-15e. Dry. TD 8,834 ft.

Kern County: Bandini Petroleum Co. 1 U. of C., 3-25s-18e. Dry. TD 1,890 ft.

Dr. D. E. Brannan and Dr. F. Brown 1 Kerry, 28-25s-18e. Dry. TD 1,235 ft.

Anthonian Drilling Co. 3 Flocker 13-29s-20e. Dry. TD 862 ft.

Santa Barbara County: Union Oil Co. 1 Dreyfus, 5-4n-29w. Dry. TD 3,052 ft.

Union Oil Co. 1 Donovan, 7-10n-34w. Dry. TD 4,174 ft.

Ventura County: Union Oil Co. 41-3 Oakridge, 3-3n-18w. Dry. TD 5,483 ft.

Union Oil Co. 11 Simi, 1-3n-18w. Dry. TD 6,640 ft.

Los Angeles County: Union Oil Co. 1 Puente Farms, 15-2s-11w. Dry. TD 6,977 ft.

MONTANA

Blaine County: Ike Taylor et al 1 Prestbo, C SE SW 10-34n-21e. Dry. TD 4,350 ft. Madison.

Chouteau County: Geo. S. Blubaugh 1 Lorenzen, SE SE SE 3-28n-9e. Dry. TD 3,033 ft. Madison.

Fallon County, Pennel Unit: The California Co. 1 Unit, C SE NW 15-10n-56e. Dry. TD 10,674 ft. Cambrian.

Fergus County: W. M. and A. P. Fuller-Lion Oil Co. 1 Henriksen, C SE SE 25-19n-23e. Dry. TD 5,907 ft. Jefferson.

Rosebud County, North Porcupine: Phillips Petroleum Co. NP, C SE SE 19-11n-39e. Dry. TD TD 3,003 ft. Otter.

WYOMING

Carbon County, South Big Medicine Bow: McElroy Ranch, Natural Gas & Oil, and Bruce Anderson 3 Horne, NW NE SW 11-20n-79w. IP 8,000 M.c.f. of gas per day, 1st. Sundance discovery, new pay. TD 5,501 ft.

Fremont County, Barren Buttes: Warren Petroleum Corp. 1 Federal Brodie, C SE NE 31-27n-92w. Dry. TD 6,512 ft.

Niobrara County, Manville: Signal Petroleum Corp. 1 Pinkerton, SE NE SW 24-33n-65w. Dry. TD 1,558 ft. Minnelusa.

Sweetwater County, Canyon Creek: Mountain Fuel Supply Co. 3 Unit, C NE SW 3-12n-101w. Shut in Mesaverde discovery, new gas field. TD 6,549 ft.

Uinta County, Stove Creek area: Stove Creek Oil Co. 3 Government, NE SE NE 27-14n-119w. Dry. TD 5,591 ft. Bear River. Shut down.

UTAH

Emery County, Cleveland: P. B. English 1 Harrison, NE SE 13-16s-9e. Dry. TD 1,810 ft. Dakota.

Grand County, Courthouse Valley: Equity Oil Co. 1 State, SE NE SE 3-23s-19e. Dry. TD 7,000 ft.

COLORADO

Adams County: Ginther-Warren & Ginther 1 Bailey, NW NW NE 22-1s-58w. Dry. TD 5,996 ft.

1 UPRR-Flader Unit "B," SW SW SW 33-2s-59w. Dry. TD 6,369 ft.

Ryan Oil Co.-Davis Oil Co.-Potter Drilling Co. 1 Doss, SE SE SW 8-2s-59w. IPF 30 BOPH, "J" sand discovery, new field. TD 6,321 ft.

Boulder County: Calstar Petroleum 1 Smith, NE NE SW 24-3n-70w. Dry. TD 4,000 ft. Hygiene.

El Paso County: Milton Peterson, Sr. and

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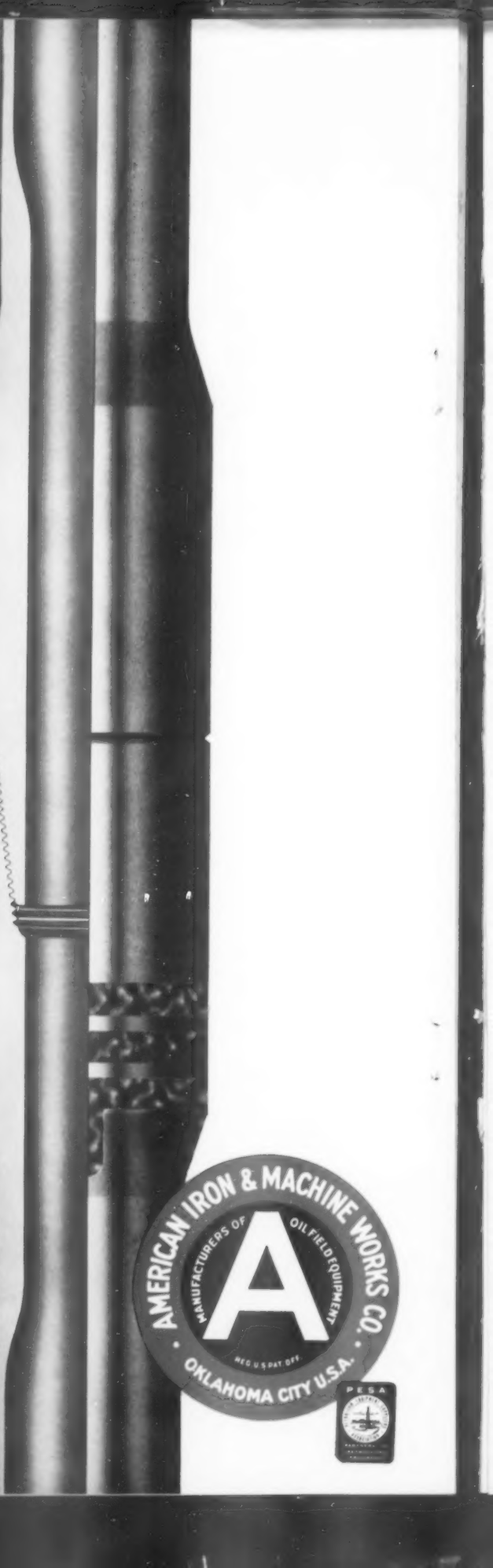

G. O. Mickelson 1 Lewis, C NW SW 23-14s-65w. Dry. TD 6,868 ft. Lyons.

Logan County: F. Kirk Johnson et al 1 Gries, SW SW SW 6-6n-54w. Dry. TD 5,277 ft.

Miracle & Fifer 1 Ashbaugh, NE NE NE 26-10n-52w. Dry. TD 4,885 ft.

Moffat County, East Powder Wash: Forest Oil Corp-Cosden Petroleum Co. 18-1 Government, Lot 8, 18-12n-96w. Dry. TD 6,830 ft. Fort Union.

Morgan County: Kirschner Oil Corp. 1 Kirschner, SE SE SE 17-2n-58w. Dry. TD 6,056 ft.

Petroleum, Inc. 1 Quinn, SW SW NW 32-4n-58w. Dry. TD 6,020 ft.

Rocky Mountain Standard, Inc. 1 Bollinger estate, C SE SE 30-1n-55w. Dry. TD 5,200 ft.

Stanolind 1 Penfold, C SW NE 14-5n-58w. Dry. TD 6,050 ft.

Routt County, Pagoda: General Petroleum 12-27 Pagoda, SW NW NW 27-4n-89w. Dry. TD 4,100 ft. Moenkopi.

Washington Sounty, Xenia: Claycomb & Guilda and New Drilling Co. 1 Rodemeister, C SE SE 13-2n-54w. IP 4,300 M.c.f. of gas per day, "D" sand discovery, new field. TD 4,895 ft.

J. A. McRae 1 Gay, NW NE SW 22-3s-53w. Dry. TD 4,857 ft.

Shell Oil Co. 1 Porter, NW NW SW 7-3s-54w. Dry. TD 4,924 ft.

Weld County: Frontier Refining Co. 1 Hankins, NE SW SE 22-5n-67w. Dry. TD 9,530 ft. Engleside.

Tom Palmer, Inc. 1 State, C NE NW 1-5n-62w. Dry. TD 7,017 ft.

MANITOBA

Sapphire 1 Kirkella, LSD 14, 12-12-29w1. Dry. TD 2,701 ft.

Sooner 8-15 Hayhurts, LSD 8, 15-9-28w1. Miss. oil well. TD 2,560 ft.

SASKATCHEWAN

British American-Husky-Phillips 6-20 Neudorf, LSD 6, 20-28-8w2. Dry. TD 2,925 ft.

Halco 5-5 East Crest Canso, LSD 5, 5-31-26w3. Dry. TD 2,446 ft.

Hudson's Bay 1 Whiteshore Lake, LSD 16, 22-35-18w3. Dry. TD 2,904 ft.

Tide Water 1 Tullment Crown, LSD 1, 29-24-12w3. Dry. TD 2,913 ft.

Tide Water 16-15 Loomis Crown, LSD 16, 15-3-21w3. Dry. TD 4,836 ft.

Tide Water 2 Eyebrown Crown, LSD 5, 30-23-1w3. Dry. TD 6,125 ft.

Phillips-Husky 1 Dungloe, LSD 8, 35-23-26w3. Dry. TD 3,280 ft.

Socony-Woodley-Southern 20-16 Freefight, LSD 16, 20-17-23w3. Dry. TD 3,348 ft.

Tide Water-Imperial 2 South Kisbey Crown, LSD 12, 22-7-6w2. Dry. TD 5,408 ft.

Phillips-Husky 1 Braeburn, LSD 2, 32-30-20w3. Dry. TD 2,840 ft.

Socony-Woodley-Southern 24-8 Maeshowe, LSD 8, 24-12-17w3. Dry. TD 4,188 ft.

Sohio 13-13 North Wapella, LSD 13, 13-15-1w2. Jurassic oil well. TD 2,870 ft.

BRITISH COLUMBIA

Toad River 1 Joint Project, unsurveyed territory. Dry. TD 6,201 ft.

ALBERTA

Gulf 5-13 Rosedale, LSD 5, 13-28-18w4. Dry. TD 5,434 ft.

Western 29-7 Suffield, LSD 7, 29-14-10w4. Dry. TD 3,773 ft.

Shell 1 Grande Prairie Strat Test, LSD 5, 14-71-6w6. Dry. TD 2,200 ft.

Gulf 15-28 Iosegun, LSD 15, 28-67-21w5. Dry. TD 9,841 ft.

Canadian Export Gas 10-20 Irvine, LSD 10, 20-11-2w4. Medicine Hat gas well. TD 1,786 ft.

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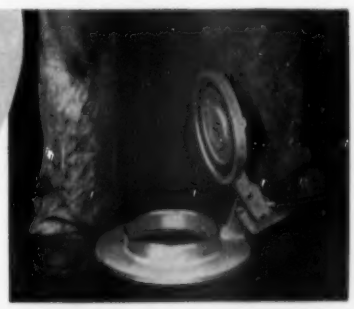

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PERSONALS

Flying Scientist

Down-to-earth researcher up in air after work day

BEFORE P. S. Williams left a research job at Washington University's School of Medicine to join Carter Oil Co., he checked Dun & Bradstreet to determine whether it was a reliable firm. Luckily for both him and Carter, it passed the test.

"And when I found out it was a wholly owned subsidiary of Jersey Standard, I figured it was safe to come to work for them," recalls Dr. Williams, now chief of research for the company and head man at Carter's sprawling laboratory in Tulsa.

Williams took his first job in the oil industry back in 1935 when jobs were scarce, even for a young man with a Ph.D.

"At that time I'd never heard of the oil business," he says, "except that I assumed some company filled the tanks that were connected to the gas pumps."

Dr. A. B. Bryan, of Tulsa, now manager of Carter's geophysical division, had gone to H. A. Wilson, head of the physics department at Rice Institute, in search of a young physicist. Wilson couldn't fill the bill, but he mentioned the job prospect to his brother-in-law, A. L. Hughes, head of the physics department at Washington University in St. Louis.

Since Williams had received his doctorate in physics at the St. Louis institution just a year earlier, and since he didn't yet have a "suitable, permanent connection," he was a logical man for the job. But it didn't come that easily, for another recent graduate seemed to have an edge on him. If the other prospect had been interested in industrial research, Williams might never had had occasion to check Carter's rating with Dun & Bradstreet.

Moves up . . . Within a few years, Carter apparently rated Williams as highly as Dun & Bradstreet rated Carter. Starting with the company as a research geophysicist, Williams was made a director of research in May 1937 and chief of geophysical research in July 1938. He was put in charge of all phases of research at the Carter laboratory in July 1946.

Williams, now 46, was born at Abingdon, Va., attended high school at Powhatan, Va., and went to nearby William and Mary College, where he received his B.S. degree in 1930.

Since a "plush, easy job" was hard to find in 1930, Williams continued his education. He decided to do his graduate work at Washington University in St. Louis because it had a highly recognized physics department, because it was farther from home, and because it offered him $750 a year as a graduate assistant while he continued his studies.

Williams was married June 14, 1934, the day he got his Ph.D. Or, as he puts it, he got "a degree in the morning and a wife in the afternoon. It was a busy day."

Unlike most oil executives, Williams has never been forced to transfer in order to get a promotion. He has been stationed at Tulsa since he started in the oil business.

Aviation enthusiast . . . Williams did not entirely escape the wanderlust fever that afflicts so many of his fellow men in the oil industry, however. He started flying as a hobby and got his pilot's license in 1953, partly, he says, "because I was getting awfully tired of dodging tank trucks on the highway." After a few practice flights, he and his 17-year-old daughter, Agnes Mary, loaded a couple of suitcases into a small plane and flew back to Virginia for a visit with his parents.

"I think my wife was a little surprised to get us back in one piece," he says.

His enthusiasm for flying has just about replaced his interest in tennis, which he describes as "something else I started fairly late in life when I should have had better sense." His family, "kind of a tennis-playing tribe," includes three other courtsters—Clayton, a student at Rice Institute, who won the Tulsa junior boys' singles in 1952-53; Agnes May, who won the city junior girls' singles this year; and Philip Karl, 14, winner in the boys' singles and boys' doubles in this year's city tourney.

Williams is willing to concede the family tennis championship, although he believes he can still beat his youngest son, 7-year-old John Leslie. "I haven't been able to beat Clayton in about 4 years," he confesses. Mary Agnes and Philip Karl probably could beat him now, he adds, "because they've got better and I've got fatter."

P. H. Holt, II, has been named head of Standard Oil Development Co.'s recently expanded patent licensing activities. Holt, formerly assistant director of Esso Laboratories' research division, has been with Standard Development since 1937. **Dr. Leonard E. Carlsmith** has been assigned responsibility for technical advice and contacts with licensees, contractors, and engineering units.

P. H. HOLT, II

L. E. CARLSMITH

Richard W. Andrus, Jr., Louis A. Beecherl, Jr., and **Herman J. Wetegrove** have organized the consulting engineering firm of Andrus, Beecherl & Wetegrove, in Corpus, Christi, Tex. Beecherl and Wetegrove were formerly with Republic Natural Gas Co. as engineers and Andrus was associated with Andrus Engineering Service and Thompson Testing Service of Corpus Christi.

L. Y. Faust of Amerada Petroleum Corp. has been elected president of Geophysical Society of Tulsa. Other officers elected include: **Frank Searcy,** Continental Oil Co., first vice president; **Ben F. Rummerfield,** Century Geophysical Corp., second vice president; **James N. Wilson,** Seismograph Service Corp., secretary; **Fielding L. Mitchell,** Carter Oil Co., treasurer, and **Charles W. Oliphant,** Oliphant Labs, editor. **A. B. Bryan,** Carter; **W. T. Born,** Geophysical Research Corp.; and **Norman Ricker,** Carter, were named district representatives to National Society of Exploration Geophysicists.

PERSONALS

Thell C. Woods, process superintendent at Deep Rock Oil Corp.'s Cushing, Okla., refinery, has been promoted to

T. C. WOODS

R. FEASEL

assistant to the vice president of manufacturing. Woods is an 18-year veteran with Deep Rock. **Raymond Feasel,** former fuels-manufacture supervisor, has been named process superintendent to succeed Woods. Other changes include **Quentin E. Benedict,** promoted from lubricants manufacturing supervisor to assistant process superintendent, and **Thomas Coleman Jones,** former shift supervisor, promoted to cracking plant foreman.

Roy P. Hardy, geologist with **M. B. Armer,** independent producer of Wichita, has resigned to become a consultant. Before joining Armer, Hardy had served with Gulf Oil Corp. and Amerada Petroleum Corp.

H. D. Fox has been promoted to chief geologist of Sohio Petroleum Co. in Canada. Fox joined Sohio in August of 1953 after serving with various oil companies in the Gulf Coast area.

R. E. Heithecker, who was formerly associated with Seaboard Oil Co., has resigned to open offices in Dallas as a consulting petroleum engineer. Heithecker had been with Seaboard since 1945 and before that had served from 1926 to 1945 with the Bureau of Mines.

H. Alan Nelson, who was formerly with Stanolind Oil & Gas Co. in Tulsa as petroleum engineer, has resigned to open consulting offices in Oklahoma City. He will specialize in evaluations, property management, and well completions.

John H. (Jack) Lewis has resigned as vice president in charge of the foreign department of Drilling & Exploration Co., Inc., after 12 years' service with the company. **Robert L. (Bob) Rose** has been named to head a new department being formed by combining the foreign department with the domestic contract drilling department. **Wallace W. March,** vice president and assistant to the president of Drilling & Exploration, has been moved to Los Angeles to be vice president and secretary-treasurer of the company's drilling subsidiary.

Herbert Hoover, Jr., who was recently appointed undersecretary of state by President Eisenhower, has resigned from the board of directors of Union Oil Co. of California. **William Henry Doheny** has been named to Union's board replacing Hoover.

D. C. Hemsell has been named manager of the land and geological department of Phillips Petroleum Co. The appointment followed division of the department into five regional headquarters staffs with offices in Bartlesville, Okla. Other appointments announced by Phillips include: **D. E. Lounsbery,** named assistant to the vice president; **A. J. Hintze,** appointed exploration director, reporting to the vice president; **W. B. Weeks,** assistant department manager; **J. A. Dolman,** geological assistant; **O. H. Whitcomb,** special representative; **H. C. Charles,** assistant to the department manager; **W. H. Courtier,** chief geophysicist; **R. L. Powell,** manager of the lease records section; **E. E. Reinhardt,** head of geological engineering analysis; **H. L. Baldwin,** manager of the northern region, which has division offices in Calgary and Alaska; **C. W. Cargile,** manager of the northeast division, which has division offices in Evansville, Ind., Wichita, and Oklahoma City; **H. S. Knight,** assistant manager and regional land man for the northeast division; **I. C. Hicks,** geological assistant to the division manager; **H. D. Brookby,** manager of the southwestern region, which has division offices at Amarillo, Wichita Falls, and Midland, Tex.; **O. D. Thomas,** geological assistant to Baldwin; **J. E. Downey,** land assistant in the northern region; **T. H. Montgomery,** assistant manager of the southwestern region; **R. J. Adams,** regional geologist for the southwestern region; **R. F. Rood,** manager of the northwestern region, which has division offices in Billings, Mont., and Denver; **H. H. Charles,** assistant manager and regional geologist of northwestern region; **G. E. Benskin,** regional land man; **M. H. Steig,** manager of the southeastern region, which has district offices at Jackson, Miss., Shreveport, Corpus Christi, Tex., and Houston; **S. K. Childers,** assistant manager and land man for the region; and **R. E. McPhail,** regional geologist.

J. H. McKeever, former area geologist with Stanolind Oil & Gas Co. at Billings, Mont., has been transferred to Casper, Wyo.

Robert C. (Bob) Pearson, former assistant project engineer with Constructora Bechtel, S.A., has joined Bechtel-Mannix-Hester at Port Arthur, Ont.

Richard D. Holt has been promoted to acting area geologist for California, Oregon, and Washington by Humble Oil & Refining Co. Before his promotion, Holt was senior exploration geologist with Humble at Phoenix, Ariz.

Duane R. Switzer has been promoted to chief process engineer at the Standard Oil Co. (Ohio) No. 2 refinery at Cleveland. Switzer replaces **Ralph G. Atkinson,** who recently moved up to assistant general superintendent of the plant.

Russell W. Holman has been named production manager of D. D. Feldman Oil & Gas, Dallas independent oper-

R. W. HOLMAN

E. J. FASELER, JR.

ator. Holman succeeds **J. E. Hooper,** who has been named special assistant to Feldman. Holman has been with Feldman since 1951 and before that served 11 years with The Texas Co. **Emil J. Faseler, Jr.,** has been promoted to succeed Holman as production department supervisor for Feldman in the firm's Houston district. Faseler joined Feldman after 9 years with Humble Oil & Refining Co.

R. M. Jorda, mechanical engineer with Shell Oil Co., has been transferred from Bakersfield, Calif., division office to Los Angeles area office. Other changes in the Los Angeles area production department include: **D. L. Jacobsen,** mechanical engineer, transferred from Long Beach to Los Angeles; **W. E. Simmons,** mechanical engineer at Ventura, transferred to New Orleans area; **W. L. D'Olier,** promoted to development engineer and transferred to Bakersfield; **H. D. English** named de-

PERSONALS

velopment engineer and moved to Ventura; **P. C. Nye,** mechanical engineer moved to Ventura; **R. L. Jewett,** development engineer, transferred from Ventura to Los Angeles, and **W. D. Larrick,** former production foreman at Ventura, advanced to mechanical engineer there.

Hobart C. Ramsey, president of Worthington Corp., has been elected a director of Tropical Gas Co., Inc.

Fred S. Watson, Jr., has joined Sohio Petroleum Co. as a geologist in the firm's New Orleans office. Watson had served as a geologist with Gulf Oil Corp. before going with Sohio.

John Brazaitis has joined the staff of the Whiting, Ind., research laboratories of Standard Oil Co. (Ind.). Brazaitis had been associated with Universal Oil Products Co. before joining Indiana Standard.

W. S. McAlister has joined Stanolind Oil & Gas Co. as a geologist at Lake Charles, La. Before joining Stanolind, McAlister was a geologist with Pan-Am Southern Corp. at Shreveport.

G. W. Watts has been named director of engineering and engineering research in the new general engineering depart-

G. W. WATTS

F. SCHEINEMAN

ment of Standard Oil Co. (Ind.). Watts has been director of engineering since 1945. **F. W. Scheineman,** chief engineer of manufacturing since 1951, has been appointed manager of the general engineering department. **G. M. Keranen,** assistant chief engineer in manufacturing, has been named assistant manager for the new department's construction, coordination, and contracts division. **W. G. Guild,** former assistant chief engineer in manufacturing, has been appointed assistant manager for design engineering. **C. E. Evans,** superintendent of the projects division at the Whiting, Ind., refinery since January 1, has been promoted to become the new department's assistant manager for project engineering.

William L. Brown, assistant foreman for Sinclair Oil & Gas Co. at Nowata, Okla., has been transferred to a similar position with Sinclair at Columbus, Tex.

O. Carrell Blair, former well tester with Gulf Oil Corp. at Buras, La., has been promoted to petroleum engineer and transferred to Daisetta, Tex.

N. M. Baird has been named manager of unitization and joint operations by American Republics Corp. Other promotions announced by American include: **R. F. Sawyer,** named manager of eastern division operations; **W. T. Bryant,** appointed manager of gasoline and cycling plants; **John S. Floeter,** promoted to manager of western division operations, and **Ralph I. Ellsworth,** named chief petroleum engineer.

R. E. Nelson, Jr., has been named assistant general manager of operations in the newly created supply and transportation department of Standard Oil Co. (Ind.). The new department, headed by **Robert C. Gunness,** became effective September 1, 4 months earlier than originally scheduled. Nelson will be in charge of all products lines, and marine, barge, and terminal facilities.

Leo A. Castler has been promoted to chief design engineer in the engineering department of General Petroleum Corp. Castler joined the company in 1943 as a senior draftsman and since 1951 has been serving as project engineer.

Robert L. Jewett, former development engineer with Shell Oil Co., at Ventura, Calif., has been named reservoir engineer for the company and transferred to Los Angeles.

DEATHS

Albert O. Lewis, 58, former owner of A. O. Lewis Oil Production Co., died recently in Red Bluff, Calif.

R. W. (Dick) Boswell, 40, engineer with Lone Star Gas Co., died September 2.

Martin C. Madsen, 61, chief engineer for Northern Natural Gas Co., died recently at his home in Omaha.

Stanwood Hall Howes, 54, chief oil dispatcher of Gulf Oil Corp.'s foreign production division, died recently at his home in Summit, N. J., following a long illness.

H. L. Hathaway, 61, sales manager for Standard Oil Co. of Texas, died September 7 in El Paso following a long illness. Hathaway joined Stanotex's parent company, Standard Oil Co. of California, 39 years ago and had served as sales manager of Stanotex for 13 years.

Noble A. Endicott, 58, vice president of Continental Supply Co. in charge of Gulf Coast operations, died at his home in Houston September 4. Endicott had been associated with Continental 38 years and had served as general manager of sales for the company from 1940 to 1948.

Max Steinbuchel, 52, Wichita independent producer, died recently at his summer home in Green Mountain Falls, Colo.

William Yates Blair, 62, production superintendent for Tide Water Associated Oil Co., died recently in Ventura, Calif., following a short illness.

J. E. House, assistant superintendent of the Puerto La Cruz, Venezuela, refinery of Sinclair Oil & Refining Co., died recently in Fort Worth. House had been transferred to Venezuela from Houston and had assisted with the construction of the Puerto La Cruz refinery.

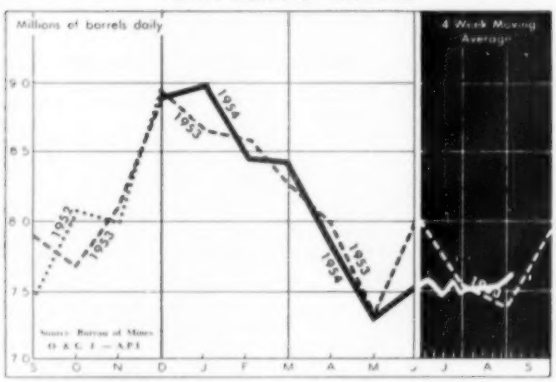
Roger H. Sherman, 50, coordinator of producing operations for Standard Oil Co. (N. J.), died September 5 at his home in Forest Hills, N. Y., following a long illness. Sherman had been with the Jersey organization since it purchased Huasteca Petroleum Co. in 1932. Sherman had gone to Mexico with Huasteca after graduating from Colorado University in 1932. With Jersey he served as head of exploration of Standard Oil Co. of Venezuela, a director, vice president, and coordinator of operations of Creole Petroleum Corp., and deputy coordinator of producing operations for Jersey. He became coordinator in 1949.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,134,350	DOWN	8,500	DOWN	462,997
Crude stocks	276,485,000	DOWN	1,303,000	DOWN	463,122
Completions	1,079	UP	133	UP	148
Refinery runs	6,946,000	DOWN	9,000	DOWN	282,000
Gasoline stocks	153,497,000	DOWN	260,000	UP	12,552,000
Four-product stocks	362,513,000	UP	3,609,000	UP	14,557,000
Total imports	1,065,100	UP	76,200	UP	44,100

TOTAL DEMAND – ALL OILS



High Gasoline Stocks May Reduce Distilate Supply This Winter

INDUSTRY'S failure to cut enough off gasoline inventories in August and September may make it difficult to meet heating-oil demands this winter if the weather happens to be slightly colder than normal.

For the past few years, winters have been warmer than normal, but refiners need to plan for at least normal temperatures. Even normal weather this winter will call for increased runs in order to produce enough middle distillate to meet the space-heating demand.

Unless there is a drastic revision in refinery yields, a big increase in refinery runs will mean a boost in the output of gasoline. The problem will be to find a place to store the extra motor fuel.

Refiners need to take a good look at demand and stock trends and then adjust operations to meet probable winter requirements.

The accompanying table shows a comparison of gasoline and middle-distillate stocks at the end of August with totals for the end of September. Note that the greatest reduction of gasoline stocks in September was the 5,000,000-bbl. drop in 1948. There seems to be little chance that gasoline stocks will go below 145,000,000 bbl. by the end of September this year. Some suppliers consider 130,000,000 bbl. as the desirable goal.

Big jump in 1953 . . . Normal growth in gasoline demand since the war has made it necessary to add about 5,000,090 bbl. per year to end-of-the-season gasoline stocks. However, the big increase in 1953 was about enough to cover growth in demand over a 4-year period. Certainly no addition was needed in 1954.

This surplus gasoline is occupying clean storage space that should be reserved for light heating oils. Note that since 1948 middle-distillate inventories at the end of September have exceeded gasoline stocks by varying amounts up to 32,000,000 bbl. The difference last year was 21,000,000 bbl., but current figures indicate that it may be down to 10,000,000 bbl. or less this year.

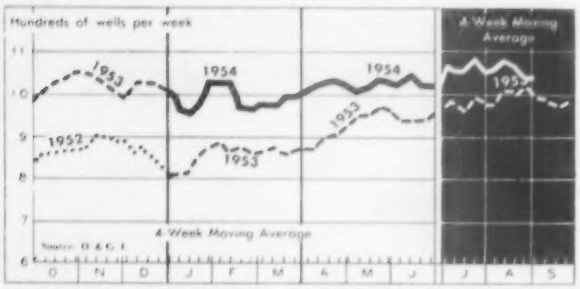
Distress gasoline, resulting from increased refinery runs during the winter months, can cause a break in gasoline markets. Middle-distillate shortages would mean higher prices for kerosine and distillate. It may take this shift in product prices to force refiners to make the necessary adjustments in yields.

STOCKS
(Thousands of barrels)

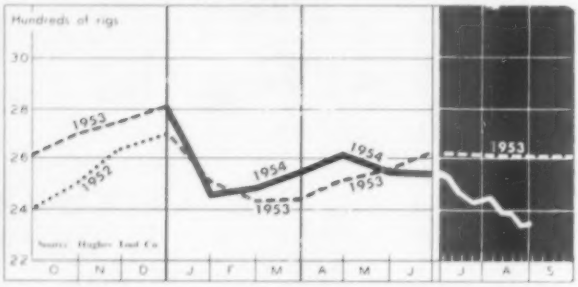
	Gasoline		Middle distillate	
	Aug. 31	Sept. 30	Aug. 31	Sept. 30
1946	86,745	87,021	73,526	83,270
1947	85,849	84,360	75,531	82,040
1948	95,445	90,518	92,382	102,497
1949	104,879	101,799	101,527	109,863
1950	107,067	105,748	94,229	105,947
1951	114,446	114,147	117,673	129,347
1952	118,592	120,991	136,658	152,273
1953*	146,050	144,184	155,253	163,989
1953†	144,238	141,902	154,351	163,137
August 27, 1954	153,757		149,244	

*Including jet-fuel components. †Excluding jet-fuel component.

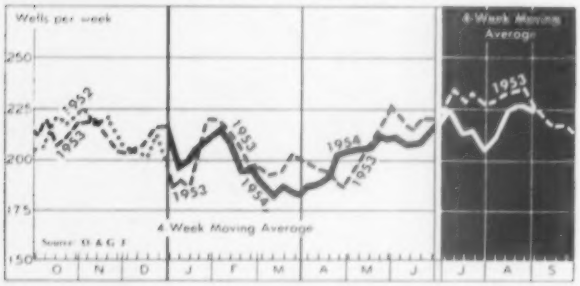
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS

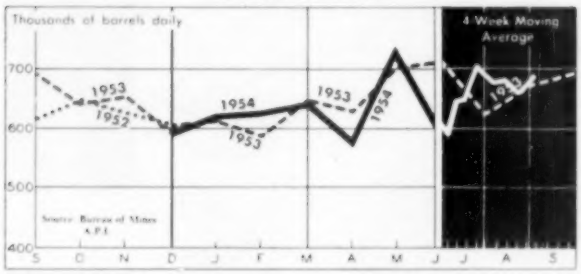
Area—	9-6-54	Change from 8-30-54	Change from 9-7-53
Gulf Coast	478	— 9	— 35
N. and W. Texas-New Mexico	725	29	— 94
Arkansas-N. Louisiana-E. Texas	173	— 2	— 12
Oklahoma	286	3	— 71
Kansas-S. Nebraska	159	—16	— 6
Illinois-Eastern	161	18	17
Rocky Mountain	245	— 3	— 28
Pacific Coast	125		— 51
Total United States	2,352	20	—280
Western Canada	118	—10	— 69

WEEKLY WELL COMPLETIONS . . . WEEK ENDED SEPTEMBER 4, 1954

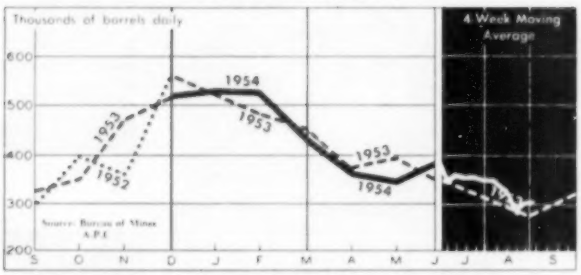
	Total of all wells: Comp.	Oil	Gas	Dry	Footage	Cum. 1954	Cum. 1953	Wildcat completions and discoveries: Oil	Dist.	Gas	Dry	Total	Cumulative total, 1954: Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	1	0	0	1	7,635	77	97	0	0	0	1	1	2	0	2	66	70
Arkansas	7	4	0	3	20,012	429	346	0	0	0	0	0	19	0	4	79	102
California	36	26	1	9	151,330	1,613	1,748	0	0	0	9	9	42	1	9	348	400
Colorado	27	6	1	20	150,460	888	467	1	0	1	16	18	25	0	13	349	387
Illinois	44	29	0	15	100,929	1,896	1,274	0	0	0	0	0	8	0	0	233	241
Indiana	20	10	0	10	29,583	536	883	0	0	0	0	0	7	0	0	96	103
Kansas	103	52	7	*44	370,318	3,107	3,327	0	0	1	14	15	52	0	15	411	478
Kentucky	20	9	8	3	62,665	753	738	0	0	0	1	1	12	0	3	77	92
Louisiana	95	67	9	19	518,546	2,374	1,787	1	1	0	9	11	76	40	27	234	377
North	60	49	1	10	160,553	1,297	745	0	0	0	4	4	11	3	11	93	118
South	35	18	8	9	357,993	1,077	1,042	1	1	0	5	7	65	37	16	141	259
Michigan	15	10	0	5	38,700	381	400	0	0	0	0	0	13	0	0	141	154
Mississippi	4	2	0	2	31,630	277	251	0	1	0	1	2	7	1	0	99	107
Montana	9	2	0	7	35,651	208	272	0	0	0	5	5	3	0	1	65	69
Nebraska	13	10	0	3	75,699	270	231	2	0	0	2	4	17	0	3	86	106
New Mexico	20	8	3	9	72,092	733	949	0	0	0	4	4	13	0	14	78	105
North Dakota	10	5	0	5	70,939	201	177	0	0	0	5	5	4	0	0	74	78
Ohio	27	10	7	†10	53,785	779	718	0	0	0	2	2	3	0	4	11	18
Oklahoma	164	87	9	‡68	598,776	6,252	5,016	4	0	0	17	21	81	3	18	444	546
Pennsylvania-New York	42	14	14	§14	70,246	1,608	1,736	0	0	0	0	0	0	0	5	28	33
Texas	372	225	21	126	1,701,628	12,646	11,713	23	1	1	81	106	567	51	123	2,882	3,623
Southwest (1 & 4)	49	24	3	22	228,021	1,811	1,903	3	0	0	15	18	78	23	33	501	635
Gulf Coast (2 & 3)	51	26	2	23	305,472	1,835	1,714	1	1	1	16	19	58	23	38	458	577
East (5 & 6)	22	6	2	14	124,530	656	540	1	0	0	8	9	11	0	13	196	220
North Central (7-B & 9)	139	92	1	46	432,422	4,736	4,461	10	0	0	28	38	262	4	16	1,155	1,437
West (7-C & 8)	90	70	1	19	543,672	2,929	2,548	8	0	0	12	20	156	0	16	507	679
Panhandle (10)	21	7	12	2	67,511	679	547	0	0	0	2	2	2	1	7	65	75
Utah	3	0	0	3	11,636	51	47	0	0	0	2	2	3	0	1	27	31
West Virginia	15	4	7	4	36,140	396	421	0	0	0	1	1	0	0	20	12	32
Wyoming	29	19	4	6	156,654	898	486	0	0	2	3	5	28	0	6	135	169
Miscellaneous (Nev., S. D.)	3	0	0	3	12,992	90	56	0	0	0	3	3	2	0	0	22	24
Total United States	1,079	579	91	389	4,378,046	36,463	33,140	31	3	5	176	215	984	96	268	5,997	7,345
Total previous week	946	489	88	369	3,745,805			25	0	6	180	211	953	93	263	5,821	7,130
Total September 5, 1953	931	505	58	368	3,837,803			33	0	5	160	198	999	73	263	6,187	7,522

Service wells included: *1, †4, ‡5, §12.

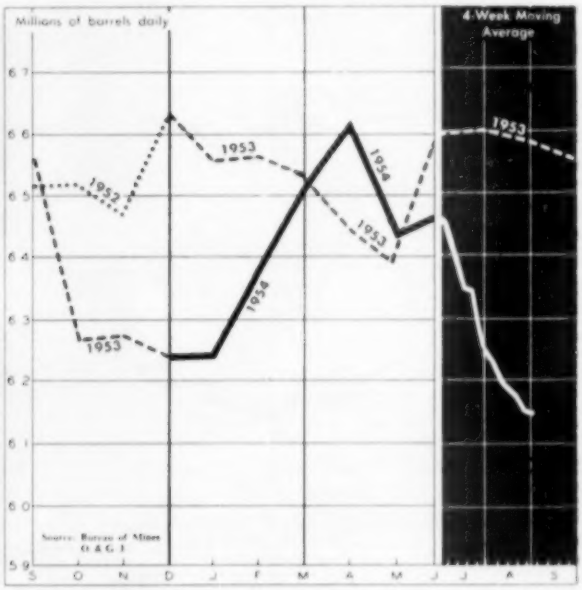
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION



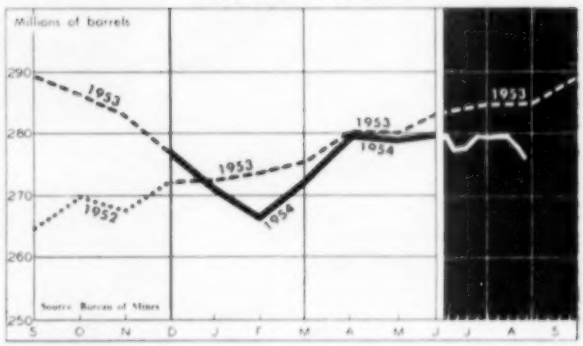
DAILY AVERAGE PRODUCTION FOR WEEK

	September 4			Aug. 28
	Crude oil	Lease condensate	Total	total
Alabama	3,900		3,900	4,100
Arkansas	76,600	500	77,100	77,300
California	971,700		971,700	972,800
Colorado	127,900		127,900	128,700
Eastern	55,200		55,200	55,100
Florida	1,550		1,550	1,500
Illinois	181,500		181,500	183,000
Indiana	28,300		28,300	28,600
Kansas	298,600		298,600	316,400
Kentucky	37,400		37,400	37,400
Louisiana	593,050	40,700	633,750	639,300
North	106,900	2,700	109,600	110,150
South	486,150	38,000	524,150	529,150
Michigan	30,100		30,100	27,700
Mississippi	87,100	3,100	90,200	90,900
Montana	39,700		39,700	40,300
Nebraska	18,600		18,600	19,000
New Mexico	205,625	1,650	207,275	207,500
Oklahoma	490,300		490,300	498,400
Texas	2,532,075	45,500	2,577,575	2,552,650
Dist. 1	41,500	400	41,900	41,550
Dist. 2	125,625	6,050	131,675	128,850
Dist. 3	401,700	22,200	423,900	422,200
Dist. 4	222,400	5,200	227,600	225,200
Dist. 5	42,650	350	43,000	42,250
Dist. 6	106,725	4,600	111,325	109,600
East Texas field	206,925		206,925	205,000
Dist. 7-B	128,850	25	128,875	125,025
Dist. 7-C	170,850	4,500	175,350	174,500
Dist. 8	821,275	1,900	823,175	815,800
Dist. 9	179,850	250	180,100	179,150
Dist. 10	83,725	25	83,750	83,525
Utah	3,600		3,600	3,800
Wyoming	245,800		245,800	244,600
North Dakota	‡14,300		‡14,300	‡13,800
Total U. S.	6,042,900	91,450	**6,134,350**	6,142,850
Change from previous week, down			**8,500**	
Canada	†274,425		†274,435	†313,625

Total U. S. production January 1-September 4 . . . 1,573,241,450 bbl.
Same period last year (crude plus cond.) . . . . . *1,614,148,077 bbl.

*Includes 22,455,400 bbl. condensate. †Week ended previous Monday. ‡Includes S. D. 100 bbl.

CRUDE-OIL STOCKS



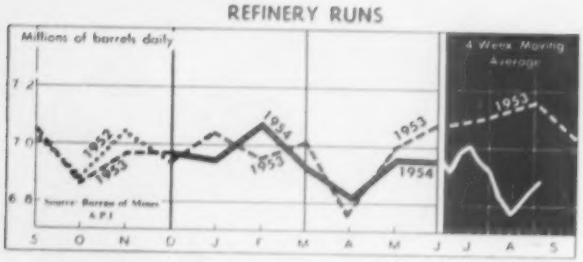
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

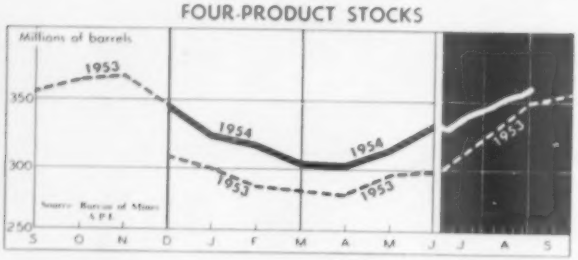
	Aug. 28, '54	Aug. 21, '54	Aug. 29, '53
Pennsylvania Grade	3,063	3,122	2,771
Other Appalachian	1,719	1,629	2,351
Illinois, Indiana, Michigan	11,873	11,938	12,262
Kansas	10,464	9,906	9,693
Oklahoma	26,732	27,047	29,673
Arkansas	3,192	3,215	2,872
Louisiana	16,987	16,813	16,806
North	2,430	2,590	2,771
Gulf	14,557	14,223	14,035
Mississippi	2,838	2,784	3,477
New Mexico	8,784	8,595	8,930
Texas	130,353	131,445	132,575
East Texas proper	10,988	11,369	11,505
West Texas	57,472	57,557	58,578
Texas Gulf	26,708	26,700	27,876
Other Texas	35,185	35,819	34,616
Wyoming	12,993	13,128	14,040
Other Rocky Mountain	4,788	5,116	3,005
California	33,029	32,783	33,884
Foreign	†9,670	10,267	10,372
Total	276,485	277,788	282,711

*Bureau of Mines. †Includes 2,647,000 bbl. in California.

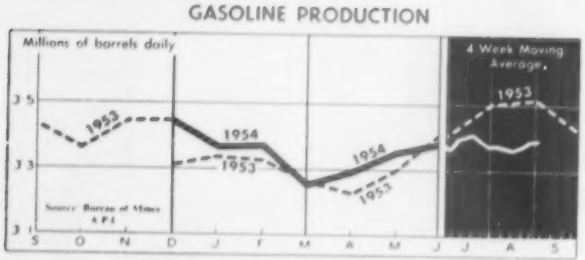
REFINERY RUNS



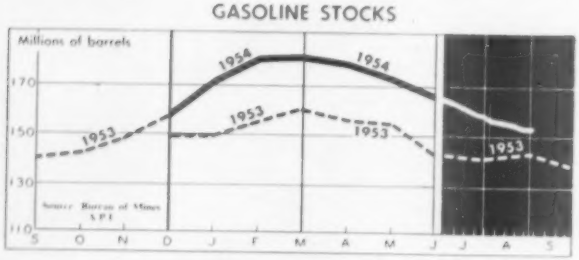
FOUR-PRODUCT STOCKS



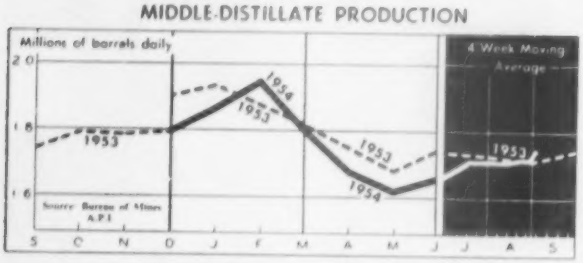
GASOLINE PRODUCTION



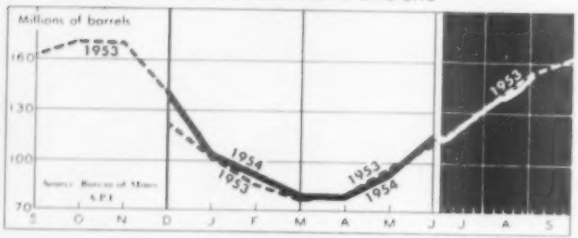
GASOLINE STOCKS



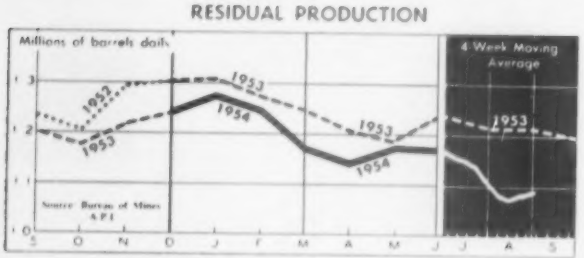
MIDDLE-DISTILLATE PRODUCTION



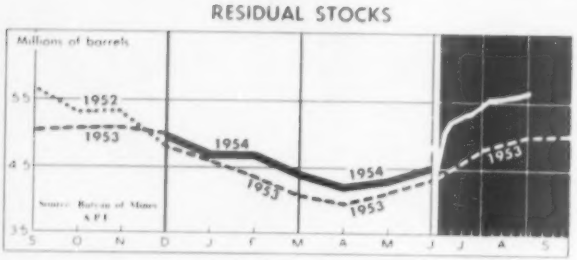
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, SEPTEMBER 3

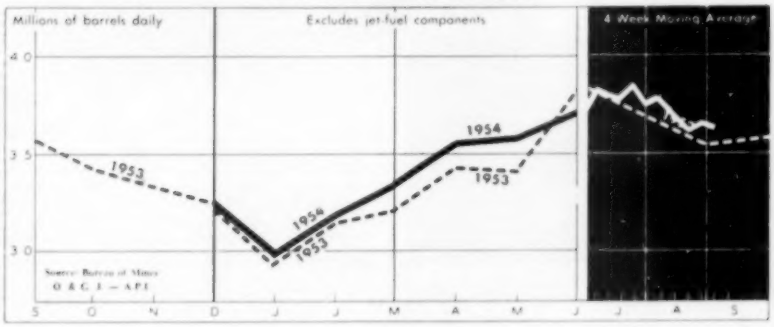
(Excludes all jet-fuel components)

(Thousands of barrels)

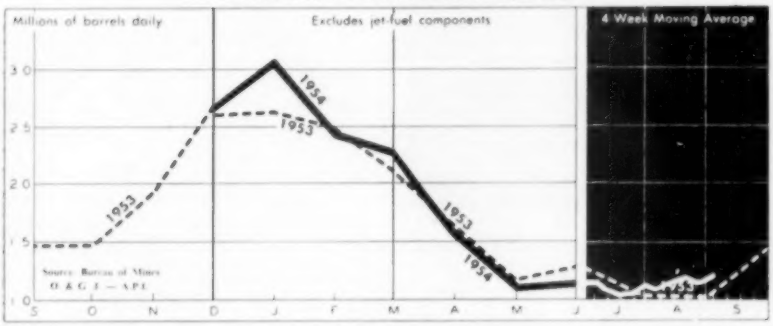
District—	Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.	Stocks‡—Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, September 1953—Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.
East Coast	1,075	430.1	36.7	298.0	198.7	34,023	14,101	41,636	11,577	1,052	420.8	35.2	249.6	227.9
Appalachian:														
District 1	111	45.1	7.3	18.5	11.7	4,095	625	1,857	414	107	46.1	5.0	20.4	11.3
District 2	68	37.1	5.1	9.9	5.9	2,328	451	739	297	85	48.5	5.3	12.6	11.1
Ind., Ill., Ky.	1,217	655.9	83.6	221.1	146.4	35,202	9,059	24,070	4,643	1,278	717.1	71.3	218.9	166.7
Okla., Kans., Mo.	615	337.7	14.9	142.1	40.3	15,221	2,224	12,158	1,128	583	353.9	17.7	134.9	45.0
Inland Texas	224	159.3	8.0	38.3	20.4	5,465	382	2,327	1,290	239	179.8	10.4	44.4	29.9
Texas Gulf Coast	1,673	824.3	132.8	360.1	220.7	19,895	4,211	12,900	6,485	1,691	835.3	118.3	398.1	238.8
La. Gulf Coast	597	346.1	69.1	149.1	39.1	8,698	2,626	5,046	1,421	546	280.9	51.1	138.9	43.2
N. La. and Ark.	87	33.9	7.4	20.1	5.9	3,899	1,000	1,151	122	86	35.9	6.8	19.1	6.4
Rocky Mountain:														
New Mexico	19	12.0	0.7	3.0	2.9	250		85	35	18	11.3	.4	3.0	2.9
Other Rocky Mtn.	261	117.9	2.6	60.5	39.0	6,276	290	2,624	830	259	125.3	3.3	54.8	42.0
California	999	407.7	3.9	109.4	350.0	18,145	395	12,865	27,952	1,079	466.3	5.1	153.1	378.1
Sept. 3, 1954	6,946	3,407.1	372.1	1,430.1	1,081.0	153,497	35,364	117,458	56,194	7,023	3,521.2	329.9	1,447.8	1,203.3
Aug. 27, 1954	6,955	3,381.0	300.1	1,443.9	1,085.0	153,757	34,260	114,984	55,903					
Sept. 4, 1953	7,228	3,460.4	304.6	1,427.9	1,306.9	140,945	35,335	120,646	51,030					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

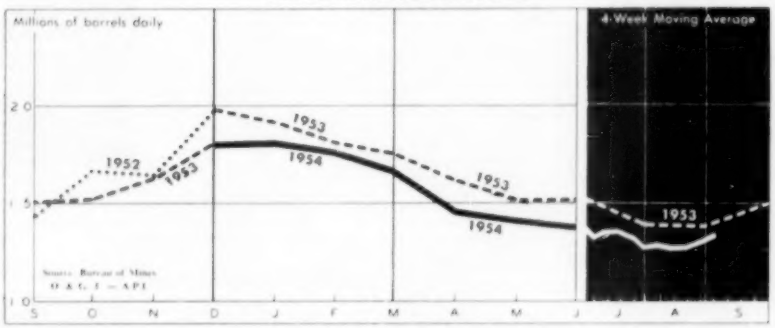
TOTAL GASOLINE DEMAND


Millions of barrels daily
Excludes jet-fuel components
4-Week Moving Average
1953
1954
Source: Bureau of Mines
O & G J — API
S O N D J F M A M J J A S

TOTAL MIDDLE-DISTILLATE DEMAND


Millions of barrels daily
Excludes jet-fuel components
4-Week Moving Average
1953
1954
Source: Bureau of Mines
O & G J — API
S O N D J F M A M J J A S

TOTAL RESIDUAL DEMAND



REPRESENTATIVE QUOTATIONS

Spot-market quotations of leading suppliers as of September 8, 1954. Prices are in cents per gallon, except for residual in dollars per barrel and wax in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.25-11	11.25-12	10.50-10.75
Premium gasoline	11.25-12	13-13.75	11.50-11.75
42-44 w.w. kerosine	9-9.25	9.70-9.95	8.75-9
No. 2 straw fuel oil	8.25-8.5	8.95-9.2	8.25-8.5
No. 6 residual	$1.20-1.25	$2.10-2.25	$1.85-1.95

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5.0	4.5	4.75
Grade 18-55	6.0	5.5	5.75

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	18
200 vis., No. 3 neutral, 0-10 pp.	13.25

WAX

Mid-Continent

132-134 A.M.P.	6.0

• Group 3 gasoline prices have not shown any improvement in the past several weeks. This week's reduction of 0.25 cent on the low is recognition of existing conditions. Some pipeline gasoline is available at even lower prices.

PRODUCTION AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

	Refinery prod.	Total demand
Gasoline:		
Four weeks ended 9-3-54	3,389	3,630
June 1954	3,379	3,894
August 1953	3,517	3,544
September 1953	3,432	3,579
Four weeks ended 9-3-54	1,759	1,239
June 1954	1,705	1,159
August 1953	1,724	1,031
September 1953	1,745	1,453
Residual fuel:		
Four weeks ended 9-3-54	1,096	1,337
June 1954	1,123	1,349
August 1953	1,222	1,411
September 1953	1,203	1,498

SUPPLY AND DEMAND*

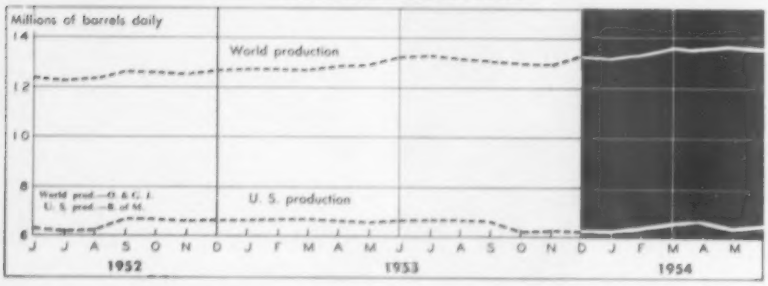
(Thousands of barrels daily)

	June 1954	June 1953
Domestic demand	7,377	7,592
Gasoline	3,768	3,756
Kerosine	151	160
Distillate	915	998
Residual	1,269	1,435
Jet fuel	141	100
Lubricants	106	116
L.P.G.	271	300
Other products	741	702
Crude loss	15	25
Exports	425	422
Gasoline	126	87
Kerosine	12	32
Distillate	81	100
Residual	80	71
Jet fuel		5
Lubricants	49	36
L.P.G.	11	8
Other products	20	22
Crude	46	61
Total demand	7,802	8,014
Gasoline	3,894	3,843
Kerosine	163	192
Distillate	996	1,098
Residual	1,349	1,506
Jet fuel	141	105
Lubricants	155	152
L.P.G.	282	308
Other products	761	724
Crude exp. and loss	61	86
Stock change	358	280
Crude	97	114
Products	261	166
New supply	8,160	8,294
Imports	999	1,050
Crude	624	707
Products	375	343
Production	7,161	7,244
Crude	6,500	6,595
Natural gasoline, etc.	661	649
Runs to stills	6,947	7,081

*Bureau of Mines.

(The schedule of selected crude prices appeared on page 190 of September 6 issue and will be printed again next week.)

CRUDE-OIL PRODUCTION

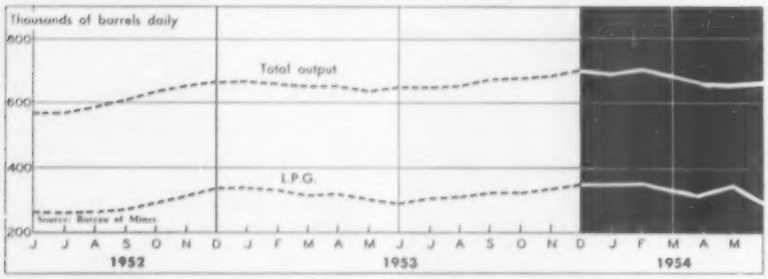


CRUDE PRODUCTION

(Thousands of barrels daily)

Month—	U.S.	World
June 1954	6,500	13,641
May 1954	6,471	13,681
April 1954	6,615	13,609
October 1953	6,262	13,030
June 1953	6,595	13,352

NATURAL-GASOLINE AND CYCLING-PLANT PRODUCTION

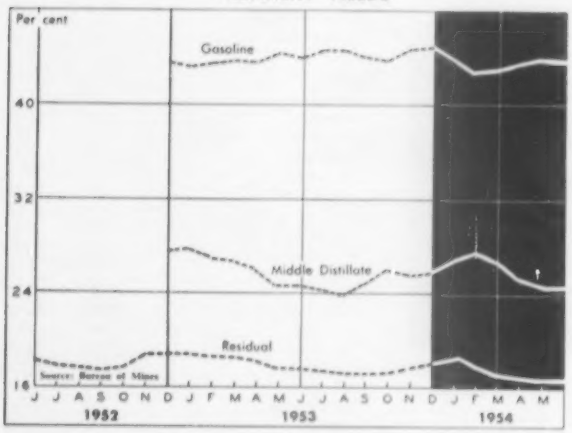


PRODUCTION AT NATURAL-GASOLINE AND CYCLING PLANTS

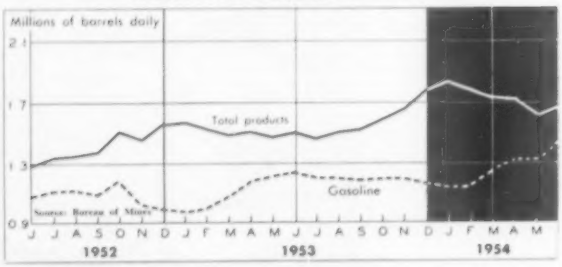
(Thousands of barrels daily)

Month—	L.P.G.	Total
June 1954	299	660
May 1954	304	657
April 1954	313	661
October 1953	321	672
June 1953	288	648

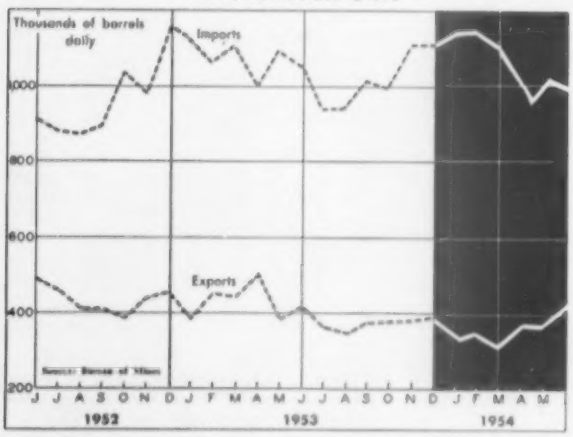
REFINERY YIELDS



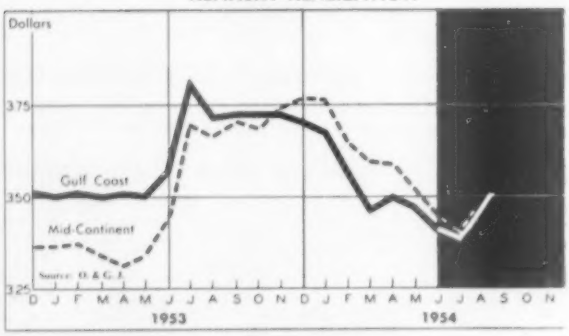
PRODUCTS DELIVERED BY PIPELINE



IMPORTS-EXPORTS



REFINERY REALIZATION



REFINERY REALIZATION

	Aug. 1954	July 1954	June 1954	Aug. 1953
Mid-Continent	$3.46	$3.46	$3.48	$3.67
Gulf Coast	3.52	3.39	3.41	3.72

Refinery realization is based on yields of major products and average spot prices of regular gasoline, kerosine, No. 2 fuel, and residual as published in The Oil and Gas Journal.

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FOR SALE EQUIPMENT

FOR SALE: Sullivan 200 complete with all tools ready to work. Located Tulsa, Okla. Contact R. F. Mesker, Phone 6-0057 or 5-9357, Tulsa.

FOR SALE: ENGINE—165 Hp. Climax Model R61, maximum continuous Hp. rating 126. Herndon Drilling Company, 421 Mayo Building, Tulsa, Phone 4-9700.

FOR SALE: 20,000' 2¼" o.d. seamless line pipe. 20' or 40' random lengths. Good as new. Reamed, beveled, ready to lay. Ideal for water, gas, air, oil, etc. M. J. Regan Pipe Co., Coffeyville, Kan.

FOR SALE—At Oklahoma City warehouse 2400' 10¾" 19.42# new Armco Spiral Weld Line Pipe, 7/32" wall, beveled 30°, in 50' lengths. Price $1.85 Ft. Cities Service Oil Company. Patridge, Bartlesville, Oklahoma.

GASOLENE PLANT *FOR SALE*

Our Arkansas City, Kansas, Gasolene Plant is available for purchase and removal by January 1, 1955. Inventory and price upon request.

Cities Service Oil Company
PATRIDGE, BARTLESVILLE, OKLAHOMA

PLANT LIQUIDATION

8—Stainless steel columns: 8' x 61', 7' x 25', 6' x 64', 6' x 45' 850#, 4' x 110', 4' x 70', 2' x 73', 2' x 39'.
9—Steel columns 7'6" x 56', 7' x 42', 7' x 5', x 70', 6' x 63', 5' x 62', 4' x 72', 3'6" x 63', 2'6" x 60', 2' x 75'.
2—1440 sq. ft. 304 SS exchangers.
2—1125 sq. ft. steel heat exchangers, 850#.
9—Kettle type reboilers, steel & SS 1250, 1125, 750, 660, 400 & 340 sq. ft.
58—Atmosphere heat exchanger units, 304 SS, 715, 477, 358 & 108 sq. ft.
60—Turbine driven centrifugal pumps, SS & Steel, 1" x 1" to 8" x 8".
2—6-stage Pacific pumps 730 GPM.
2—Clark MA-4 150 BHP engines.
2—Union Iron Works 30,000#/hr. water-tube boilers 240 PSI complete.
2—Oliver 8' x 10' Rot VAC Filters.
Bird 36" x 50" Centrifuge.
5' x 12', 4' x 6' Drum Flakers.

Detailed circular upon request.

BRILL EQUIPMENT COMPANY
4101 San Jacinto St., Houston 4, Texas, Justin 6832
Sell us your surplus equipment

FOR SALE EQUIPMENT

FOR SALE—At Oklahoma City warehouse, 10,000' New Republic 6⅝" OD 14.97#, electric weld line pipe, 30° beveled end, DPL, Grade "B". All or any part, $1.275 Ft. Cities Service Oil Company. Patridge, Bartlesville, Oklahoma.

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

PAIR SURPLUS 1879 Buda engines completely overhauled since use, each equipped with Twin Disc 27-inch hydraulic couplings. Engines located Wolf Trucking yard, Edmond, Okla. Price for pair, $7,000.00. Chester H. Westfall, Phone 4-3144, Tulsa.

FOR SALE, 1 LRO Waukesha A1 Condition. 1 D17000 Caterpillar with Clutch, Skid Mounted. G&H Supply Co., Oklahoma City.

FOR SALE—2500' rotary—or will make drilling deal. Box H-409, The Oil and Gas Journal, Tulsa, Oklahoma.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.
H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

FOR SALE
INGERSOLL-RAND
GAS ENGINE DRIVEN COMPRESSORS

1—	XVG-8	—350 H.P.
1—	XVG-6	—250 H.P.
1—	XVG-4	—150 H.P.

ANY COMBINATION COMPRESSOR CYLINDERS. SPECIFY INLET AND DISCHARGE PRESSURES. PROMPT DELIVERIES.

EARL E. KNOX COMPANY
TELEPHONE: 2-5204
BACON STREET, ERIE, PA.

FOR SALE EQUIPMENT

NEW. For Sale: 85, 4" o.d. seamless couplings. 8 rd thread, 5¾" long. Weight 6½ lbs., $4. each. M. J. Regan Pipe Co., Coffeyville, Kan.

FIVE TYPE 80 COOPER Gas-Engine compressors. Thirty 20-in. stroke compressor cylinders—size 5½ in. to 26 in. Pressures to 1,000 lbs. W. S. Smith, 205 Thompson Bldg., Tulsa, Okla.

1—MODEL RL 3-Drum Cardwell Powered with Buda Model 844D Diesel Engine. Rig and Engine in Perfect Condition. 1-87' 2-Pole Mast. Box H-404, The Oil and Gas Journal, Tulsa, Oklahoma.

U-15 WITH hydromatic brakes, powered by four 250 Horse Power Cummins diesel engines through hydraulic couplings with 127' Lee C. Moore mast, 4½" drill pipe, 6¼" drill collars. Oilwell 14P pump, mechanical Shaffer double BOP and all accessories for complete rig. First class operating condition. Rocky Mountains. Inventory on request. Box H-405, The Oil and Gas Journal, Tulsa, Oklahoma.

WILSON GIANT—Serial No. 6383. Sales Price—$6,000. Equipped with Two Waukesha 145 GK Engines in good condition. General Appearance—Fair. Rig used for Work-Over. Price includes Keico Spinning and Foster Breakout Catheads; Stromberg - McCreary Air Starters on Engines. Brakes circulating water-cooled; Manual Friction Clutches in Transmission; Others — Jaw Clutches. Rig has Slush Pump Drive and Rotary Drive. Location of Unit—Lake Charles, Louisiana. Contact Cardwell, Houston.

GASOLINE PLANT *FOR SALE*

Gasoline Plant, located in Brazoria County, Texas, shut down in January, 1954. Had been processing approximately thirty-three million feet of gas daily with absorber pressure approximately six hundred thirty pounds. Plant recovered Propane, Butane, Gasoline, Kerosene and Diesel Oil. Adequate storage tanks for all products. Drum Lead Blending Plant. Detailed inventory available upon request.

SOUTHERN PRODUCTION CO., INC.
P. O. Box 670, Ft. Worth, Texas

FOR SALE
EMSCO GB 800 RIG

This rig fully equipped with many extras. Less than 45,000' of hole drilled with rig and accessories since new. Inventory includes grooved drum, dynamatic brake, heavy duty mast, 12 foot substructure, 2 pumps including Gardner-Denver 800 H.P. GXR, 3 LRDU Waukesha Diesel Engines, Steel Mud Tanks, 4½" Grade E Hand Banded Drill Pipe, 6¼" and 7¾" Drill Collars. This rig is priced right. For details contact

BOX H-307, THE OIL AND GAS JOURNAL,
Tulsa, Oklahoma

FOR SALE EQUIPMENT

FRANKS MODEL 5000 Spudder — Serial No. 866. Sales Price—$7,500. Equipped with one Cummins HB1-600 Engine in good condition. Brake Rims in fair condition; Brake blocks—Good. General appearance—Good. Chains—Good. Basic Machine equipped with Spudding attachment, Skid and 6" Double Leg Pipe Mast with 6⅝" and 7" Pipe Legs; 4-Sheave Crown of Wilson Manufacture. Price includes Mast Guy Lines. Location of Unit — Western Kansas. Contact Cardwell, Wichita.

FOR SALE: Model "K" Cardwell tubing and rod unit complete with tubing and rod tools, mast, mounted on Ford tandem truck. Melco Drilling Company, Seminole, Oklahoma.

FOR SALE: 96' Emsco Mast, 7½ x 12 G-D Pump with WAKU Waukesha, U-10 Unit Rig with (2) Gas Engines, 7¼ x 14 G-D Pump, Short Skids, 17½ FE Ideal Table, 54" Centers, Rebuilt Wilson "Giant" 2 engine rig drive, less engines, 5KW LeRoi Light Plant. For photos, detailed descriptions, prices, contact G. B. Pearson, J-S-G, Inc., 501 NE 26th, Okla. City, Jackson 5-6232.

WELL DRILLING EQUIPMENT. New and used spudders, rotaries, core drills. Tools, pipe, cable. Everything for well drilling. Fishing tools rented. Pressey & Son, Pueblo, Colo.

WILSON ATLAS. Sales Price—$21,000.00. Equipped with two LI-600 Cummins Diesel Engines in good condition: includes pump drive, 12 PD groove sheave and V-belts. One American cathead and one plain spool cathead. Compound enclosed oil-bath. Includes one 1000 gal. fuel tank. Contact Cardwell, Houston.

COMPLETE RIG: New U-15 Drawworks with four 250 Horse Power Cummins diesel engines through hydraulic couplings, hydromatic brakes on 127-foot 450,000-lb. Lee C. Moore mast and substructure, 8,000 Ft. 4½" Drill Pipe, 14 new 7" O.D. x 2⅞" Bore Drill Collars, new Emsco D-500 7½" x 16" pump, new Cameron twin hydraulic BOP, and all accessories. Good condition. Now drilling 8,000-foot well in Rocky Mountain area. Inventory on request. Box H-403, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE

50,000' - 10¾" O.D., 40#, Bevelled for Welding, x 40' No. 1 Used Pipe.

Located Spiro, Texas

Attractively priced!

HORWITZ PIPE & STEEL COMPANY
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VALVES

A complete line of reconditioned & tested steel & cast iron

GATE VALVES

"Like new" performance. Guaranteed at substantial savings.

Hudson Pipe & Supply Co.

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USED EQUIPMENT

Model E Allis-Chalmers Skid Unit mounted on International Truck. Located Great Bend, Kansas.

Franks 7000 Single Drum Skid Swabbing Unit mounted on Dodge Tandem Truck. Located Odessa, Texas.

Franks SAL 4500 Skid Rotary Rig Cummins Power, 96' Derrick. Located, Tulsa, Oklahoma.

O.C.S. Type 3 Servicing Unit mounted on 1942 Mack Truck. Located Odessa, Texas.

Franks Super Senior Well Servicing unit 5 x 10 x 62 Single Pole Mast mounted on Tandem International Truck, Located Seminole, Oklahoma.

Write, wire or call Franks Mfg. Corporation, Box 5218, Whittier Station, Tulsa, Oklahoma.

EQUIPMENT WANTED

WANTED: 126' or 127' Lee C. Moore Mast, National "75" Drawworks with or without rig drive, 7¼ x 10 G-D Pump only, Model U-34 or equivalent single engine drawworks, complete string tools 4000' work, trailer mounted equipment preferred. Submit offers G. B. Pearson, J-S-G, Inc., 501 NE 26th, Okla. City, Jackson 5-6232.

WE WANT TO BUY—1—4" stationary head for old style 4" Landis Machine. W. H. Greer Supply Co., Owensboro, Ky.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

PODBIELNIAK "Hydrobot" low temperature distillation apparatus; photoelectric spectrophotometer, Beckman model DU preferred; Freas or Dispatch forced-draft oven; misc. lab equipment. Box 1546, Brownsville, Texas.

WANTED

Used API Bolted Steel Tanks

Contact—
NORMAN STRAUSS

Brown-Strauss Corporation

1546 Guinotte Avenue
KANSAS CITY, MISSOURI

WANTED

Crude Oil Tank Bottoms and Unmarketable Low Gravity Crude

Contact—
RAY M. CODER

Chanute Refining Company

CHANUTE, KANSAS

HELP WANTED

DRAFTSMEN for Eastern Products Line. Experienced in Mapping, Piping. Permanent position for right men. Located near Allentown, Pennsylvania. Reply should include age, resume of experience, education, references and salary requirements. P. O. Box 68, Emmaus, Pennsylvania.

SEISMOGRAPH PARTY CHIEF for small aggressive company. Minimum five years experience. Send transcript of college credits and brief outlining experience. Opportunities unlimited. Replies confidential. Box H-365, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

SOUTH AMERICA. Major Oil Company. Our fee paid. Mechanical Engineer—Petroleum Engineer—Chemical Engineer—All requiring Degree, experienced or inexperienced. Geologist, single. Must have degree, some experience. Tool Pusher—under 40, three years' experience. Accountant—Degree, Accounting major, single. All information confidential. Contact CHAS. J. LOVELESS PERSONNEL SERVICE, 616 S. Main, Tulsa, Oklahoma. Phone 4-3193.

WANTED—Mathematical Analysis Group has openings for TWO mathematicians or physicists with advanced degrees and background in applied mathematics, numerical analysis and digital computing.

One position involves planning and supervision of numerical analysis and digital computing on reservoir engineering and petroleum production problems.

The other position involves mathematical analysis of refinery, pipe line, and exploration problems, including linear programming for optimum operations.

New laboratory building. Excellent benefits and working conditions. Address letter giving education, experience and salary requirement to Personnel Records Division, Continental Oil Company, Ponca City, Oklahoma.

HELP WANTED

TRAINING SUPERVISOR. Excellent opportunity in Rocky Mountain Area. Must be experienced in this work, under 30, college graduate preferred. Salary to $500. All replies confidential. Send complete resume to CHAS. J. LOVELESS PERSONNEL SERVICE, 616 S. Main, Tulsa, Oklahoma. Phone 4-3193.

ACCOUNTANT for Independent Rocky Mountain operator, experienced in oil development, production, transportation and income tax. CPA preferred. Give full details of personal history, education, experience and earnings in initial reply. All replies confidential. Box H-377, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER—with 2-4 years technical experience in petroleum refinery operations. Position in research and engineering department of chemical company in midwest area. Work invloves petroleum refining and fuel manufacturing relationships. Box H-372, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER WANTED
Houston Oil Refinery has opening for graduate Chemical Engineer with five or more years experience in the Petroleum Industry. Send complete resume to P. O. Box 5008, Harrisburg Station, Houston 12, Texas.

WANTED FOR EMPLOYMENT
Petroleum Engineer, preferably recent graduate for Louisiana Gulf Coast work. Duties to require assistance in preparation of reservoir studies, evaluation and routine engineering reports. Work located in New Orleans with reliable and financially strong concern. Reply giving age, previous experience, if any, military status, and salary desired. Inquiries will be kept strictly confidential. Our employees know of this ad. Box H-381, The Oil and Gas Journal, Tulsa, Oklahoma.

MAJOR OIL COMPANY desires maintenance supervisor for West Texas-New Mexico Area. Will supervise maintenance in Gasoline plant. Chemical, petroleum, or natural gas engineering degree required with a minimum of two years gasoline plant or refinery experience. If qualified, send details to Box 2819, Dallas, Texas.

PETROLEUM ENGINEERS

Experienced graduate engineers or recent graduates, for immediate and future job openings in Saudi-Arabia and New York City. For engineering work in development, production, drilling, process, and oil and gas engineering on primary and secondary recovery problems.

Salaries commensurate with education and experience. Write giving full particulars regarding personal history and work experience. Please include telephone number.

Recruiting Supervisor, Box 79

ARABIAN AMERICAN OIL COMPANY

505 Park Avenue
New York 22, N. Y.

SERVICE OPERATOR

Major processing company serving the petroleum refining industry needs service operator. Man must be willing to travel. College education preferred.

BOX H-401,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

HELP WANTED

WANTED: Distributor for Gas Lift Equipment in West Texas. Preferably Engineering or sales organization now operating in West Texas. Commission far above average. Macco Oil Tool Co. Inc., P. O. Box 7288, Houston 8, Texas.

EXPLORATION MANAGER

Independent oil company has opening for experienced Exploration Manager, to direct land and geological activities in Mid-Continent and Rocky Mountain Areas. Must be capable of handling all phases of land and geological operations, originating and closing deals, between ages of 30 to 40, with major oil company training preferred. Unlimited opportunity for person qualified. In replying give past employment record, educational background, and complete personal data. Box H-414, The Oil and Gas Journal, Tulsa, Oklahoma.

MECHANICAL
DESIGN
ENGINEERS

EMPLOYMENT OPPORTUNITIES

in

SOUTH AMERICA

Attractive staff positions available with affiliates of STANDARD OIL COMPANY (N. J.). Engineering degree and 3 - 5 years oil refinery or chemical plant design experience required.

Liberal salaries and benefits.

WRITE

giving age, education, marital status and detailed experience resume.

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RADIO CITY STATION
NEW YORK 19, N. Y.

SITUATIONS WANTED

PRINTING PLANT SUPERVISOR wishes position in or outside U. S. 25 years experience most phases of industry; capable of writing and producing small house organ. College background; family man; last position as supervisor held for eight years. Go anywhere, preferably Mexico or South America. Interested in personnel work; know people; speak a little Spanish, quick to learn. Write P. O. Box 9211, Dallas, Texas.

EXPERIENCED DRILLING and Production Superintendent available immediately. Rotary and Cable tools, deep and shallow wells, high and low pressure, installation and operations of Cold separation units, capable of taking charge of complete operations of reliable company. 20 years experience, 43 years of age, married, sober. Best of references. Box H-408, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Independent Producers. Has the gas or natural gasoline aspect of your business grown until it needs experienced attention? Graduate Engineer, forty-two years of age with broad experience in gas-gasoline phase desires connection with progressive company. Experience includes production, design, construction, and operation of gas-gasoline plants including purchase and sales contracts. Box H-412, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE MANAGER

10 years broad organizational experience comprising sales management, procurement, machine tools, public relations, legislative, legal procedure; general management combined with 5 years experience general oil exploration, leasing, financing, drilling; Texas, Louisiana, Kentucky, Indiana areas. Age 35, married, 2 children. Best bank and personal references. Present earnings $30,000. Desire connection general oil operating company with opportunities to participate in development of new reserves. Available short notice. Box H-406, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

PETROLEUM PRODUCTION ENGINEER—34; married; employed; seven years experience drilling, primary and secondary recovery operations. Desires responsible engineering position with producing company. Permian Basin, North Texas preferred. Box H-399, The Oil and Gas Journal, Tulsa, Oklahoma.

GERMAN DRILLING EXPERT. 25 years experience, 10 years supervisor with German major deep drill company. Best credits, partly translated. Desire new start. Age 43, 10 months in U.S.A., English not perfect. Kurt Eichholz, Route #3, Joliet, Ill.

SALES MANAGER or other executive position wanted, with opportunity to purchase stock, in oilfield Sales and Service or Specialty firm. Now owner of similar small business, can transfer present accounts to new company on mutually profitable basis. Experienced, excellent background, extensive oil industry contacts. Only attractive proposition by reliable firm considered, preferably Houston or Gulf Coast location. Box H-395, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER—5 years excellent experience drilling, production, waterflooding, unitization, property valuation in Mid-Continent. Presently employed. Desires job with sound aggressive independent. Locate anywhere. Box H-416, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANT 39, employed past four years as Chief Accountant-Office Manager for company in Mexico. Previous experience in South America. Speaks Spanish. Good accounting education. Seeks position with active oil company, either in States or South America. Detailed resume on request. Available reasonable notice. Box H-411, The Oil and Gas Journal, Tulsa, Oklahoma.

DRAFTSMAN, 3 years experience Seismograph Surveyor. References. Two years College. Desires permanent location. Box H-396, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, 7 years diversified experience major company, desires position with smaller organization in South Texas or Gulf Coast area. Box H-407, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEER. Interested in a connection with a progressive company which does not require excessive travel; experience includes introduction of new processes; presently located at Wichita Falls, Texas, will relocate for the right deal; has wide acquaintance in oil industry and related fields. Box H-413, The Oil and Gas Journal, Tulsa, Oklahoma.

MAN MATURE in years with 25 years major oil companies experience. Capable and experienced in handling all phases of land department operations, past 5 years in administrative field. Valuable contacts established in Texas and Oklahoma. Desires connection with reliable Independent. Salary or Salary and interest. Box H-400, The Oil and Gas Journal, Tulsa, Oklahoma.

MAN MATURE in years, experience and judgment wants connection with active organization, Houston area. Experienced oil field equipment management, oil marketing and various phases of industry. Valuable connections in these and allied lines. Direct inquiries to Box H-391, The Oil and Gas Journal, Tulsa, Oklahoma.

M.S. IN CHEMISTRY, 38, married, ambitious, 5½ years varied operating experience: Gasoline, Sulfur, Girbotol Plants. Research. Laboratory organization. Technical papers published. Presently holding responsible position. Desires relocation with opportunity for advancement. Box H-351, The Oil and Gas Journal, Tulsa, Oklahoma.

Well organized, well established oilwell drilling contractor desires the management and supervision of oil properties in West Texas, Central Texas, and New Mexico. Can provide complete handling of oil properties, from acquisition to production. No properties too small, and none too large to handle. Inquiries from independents, groups, small or medium sized oil companies invited. Write, wire, or call collect for further information.

MAKIN DRILLING COMPANY
P. O. Box 1628, Hobbs, New Mexico.
Phone 3-3141.

146 Allen Building, Midland, Texas.
Phone 2-2962.

INSTRUCTION

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EQUIPMENT MEN

Fluor of Canada Opens An Office at Calgary

C. G. BRAGG

The Fluor Corp. of Canada, Ltd., Toronto, Ont., has announced the opening of a new office at Calgary, according to P. D. Mellon, special representative there. C. G. Bragg will be resident manager, and Mellon will continue to act in an advisory capacity. J. T. Sparling, Sparling Sales, Ltd., Edmonton, will represent Fluor of Canada in that area.

Bragg has been a process engineer with Fluor for the past 8 years, specializing in process engineering on gas-treating plants, sulfur recovery, and various chemical processes. Prior to joining Fluor in 1946, Bragg was associated with Mellon Institute of Industrial Research, investigating coal-tar products, and with Koppers Co. at its butadiene-styrene plant near Pittsburgh.

National Supply Names Crawford District Manager

William D. Crawford, an employe of National Supply Co. since 1938, has been appointed district manager of the New York and Pennsylvania district, with headquarters at Titusville, Pa.

He will have supervision over the supply stores at Bolivar, N. Y., and at Bradford, Butler, Renovo, Titusville, and Waynesburg, Pa. He succeeds Ralph M. Barr, who has been transferred to the Ohio district.

Crawford started as a clerk in the Clay City, Ill., store and has served since as a store manager, service man, and specialty salesman. Since 1949 he has been a field salesman for the Mount Pleasant, Mich., store.

Grove Regulator Opens New Orleans Office

Grove Regulator Co. has announced the opening of new offices in New Orleans, La., to serve expanding markets in that area. Appointment of W. J. Hancock as district manager in charge of the new office has also been announced.

Prior to his transfer to New Orleans, Hancock was assigned to Grove Regulator's Corpus Christi office. Since graduating from Texas A & M College, Hancock has served in sales engineering and other capacities connected with the oil and gas industries.

Snyder Co. Named Agent By Robinson Orifice

Snyder Co., Houston, has been appointed the Houston and Corpus Christi, Tex., area exclusive representative for Robinson Orifice Fitting Co., Los Angeles, according to Oliver W. Muff, general manager of Robinson Orifice. Snyder Co. has long been active representatives of Robinson in Kansas City, Tulsa, Dallas, and Odessa, Tex., territories.

Jack Ribble, formerly with Phillips Petroleum Co., Bartlesville, for over 20 years, has been appointed manager of Snyder's Houston office. L. M. Petrie, formerly sales engineer in the Odessa office, has been transferred to Houston as assistant to Ribble.

Nordberg Announces Key Sales Shifts in Dallas

MARVIN WALL

R. C. GAMBLE

Appointment of Marvin Wall as district manager of the heavy-machinery division and R. C. (Dick) Gamble as sales engineer, Dallas territory, has been announced by R. W. Bayerlein, vice president, heavy-machinery division, Nordberg Manufacturing Co., Milwaukee.

Wall succeeds C. B. Trimble, recently retired. He assumes the responsibility for serving Nordberg customers and prospective users in Oklahoma, New Mexico, and North and Central Texas.

Wall started his career with Cooper-Bessemer Corp. in 1935, where he progressed from the parts department to manager of that department, and to sales engineer in the southwestern states. In 1949, Wall joined Nordberg to serve as sales engineer in the Dallas territory until his recent appointment.

Gamble joined the Nordberg organization in 1948. He was assigned to export sales department, and in 1952 was promoted to sales and service engineer serving distributors for Nordberg's line of 4FS diesels from 10 to 45 hp.

Gamble will assist in field engineering and the sale of Nordberg's extensive line of heavy-duty engines ranging up to 10,800 hp. His assignment to the Dallas territory continues his responsibility for distributor contacts for the smaller engines.

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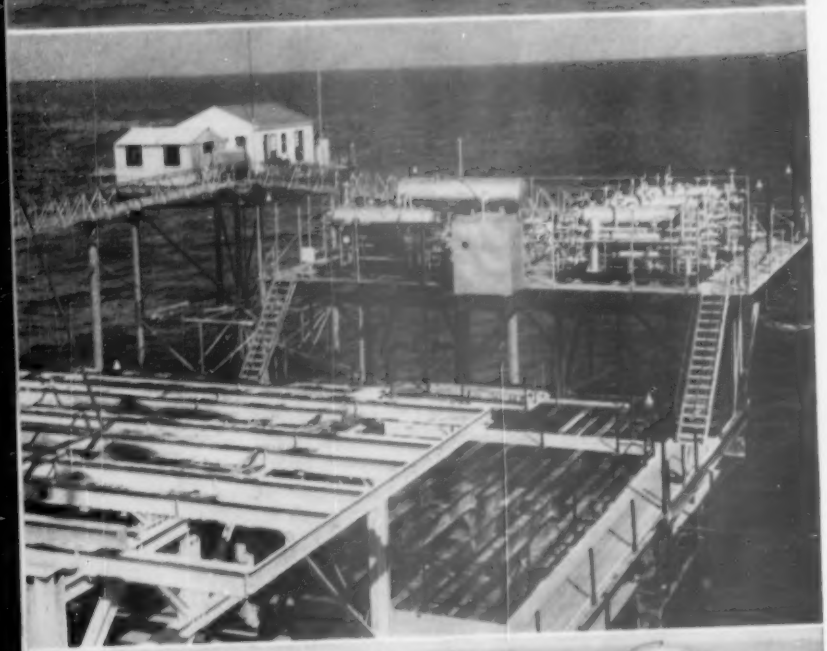

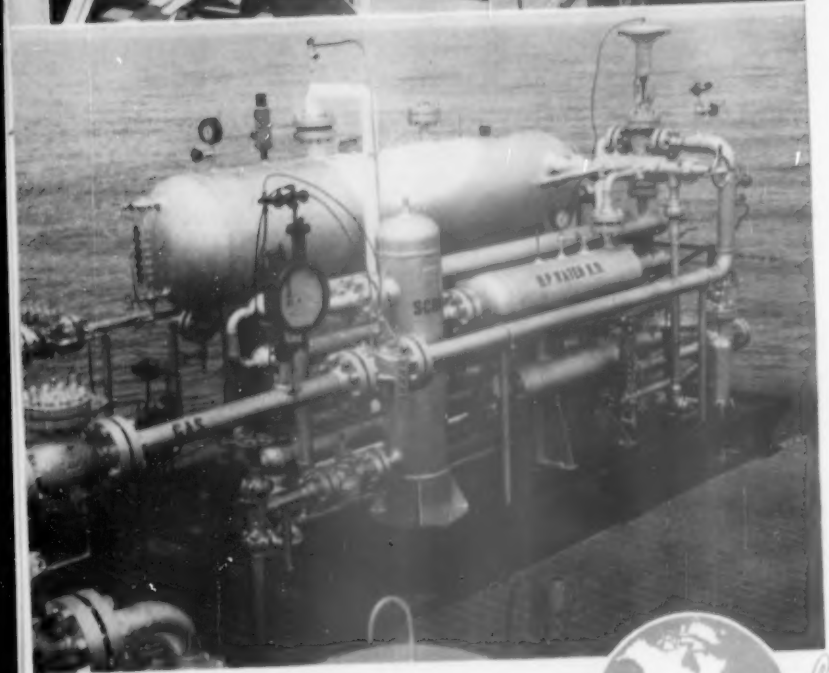

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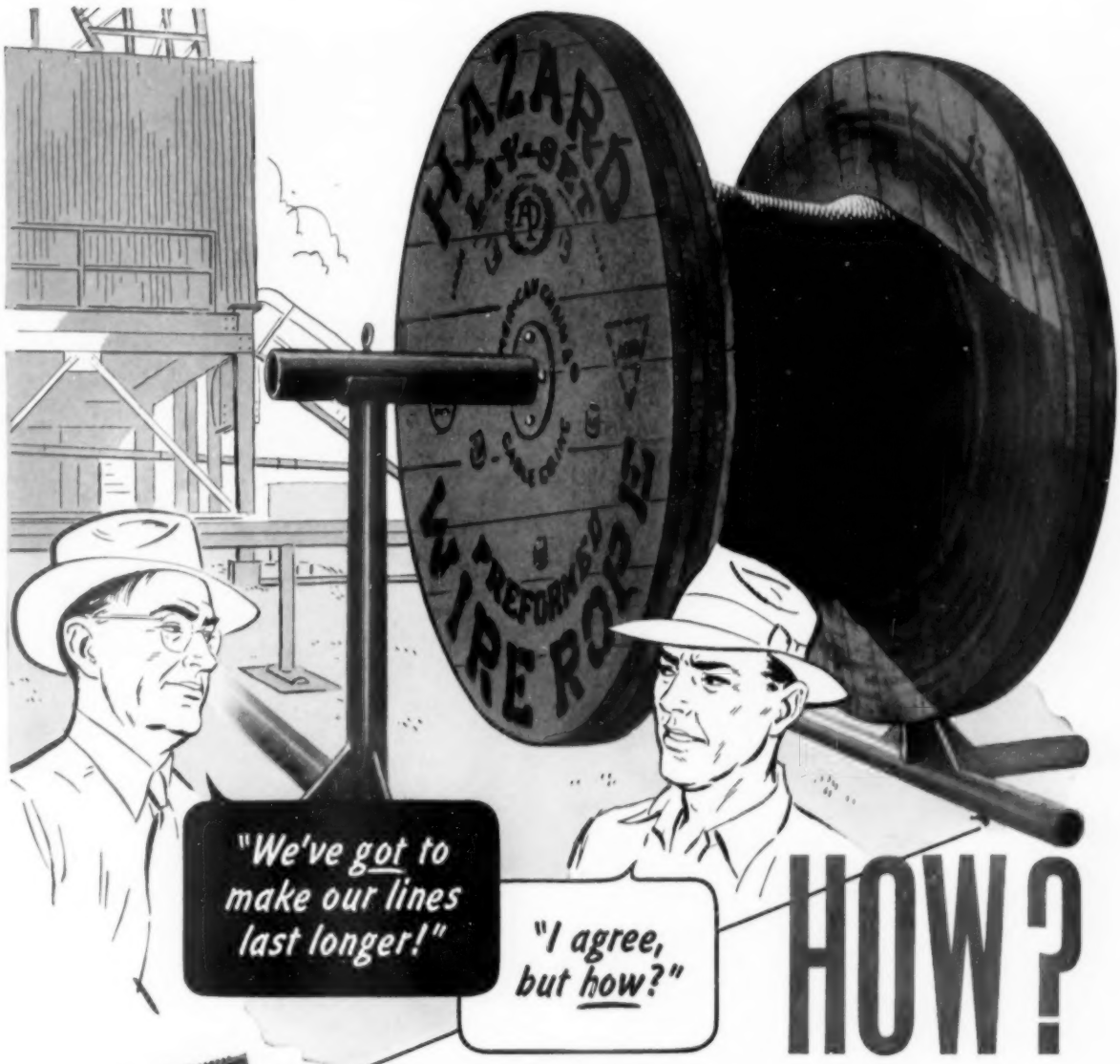

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